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THE NATURE-STUDY REVIEW

DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

OFFICIAL ORGAN OF

AMERICAN NATURE-STUDY SOCIETY

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AMERICAN NATURE-STUDY SOCIETY

The two meetings held at Baltimore on December 29th and 30th were devoted to the relation of nature-study to elementary agriculture and high-school sciences. The papers read will be published in March or April.

Report of Business Meeting

At a business meeting of the Society, held as previously announced in THE REVIEW, the following business was transacted:

Election of officers. The chairman appointed tellers who after counting votes cast by members present and those received by mail, declared the following new officers elected: *President*, Professor C. F. Hodge, of Clark University, Worcester, Mass. *Vice-presidents*, Professor V. L. Kellogg, of Stanford University, Calif.; Professor F. L. Stevens, N. C. College of Agriculture and Mechanic Arts, Raleigh, N. C.; Professor W. Lochhead, Macdonald College, Quebec; Professor O. W. Caldwell, The University of Chicago; Professor B. M. Davis, Miami Univ., Oxford, O. *Directors* (for two years)—G. H. Trafton, Public Schools, Passaic, N. J.; Professor F. L. Holtz, Brooklyn Training School, N. Y.; Professor J. Dearness, Normal School, London, Canada; Mrs. Anna Botsford Comstock, Cornell University, Ithaca, N. Y., and Dr. Ruth Marshall, Milwaukee High Schools.

A resolution was passed instructing the secretary-treasurer to make the annual report cover the calendar year 1908, and after approval by an auditing committee, to be appointed by the president, to publish the full report in THE NATURE-STUDY REVIEW.

A motion was passed requesting the council to add to the list of committees under consideration a committee on training of teachers of nature-study.

INDUSTRIAL EDUCATION AND NATURE-STUDY

Many friends of the nature-study movement have for many years believed that somehow nature-study must be brought into closer contact with every-day life. This idea has led naturally to the suggestion that there must be some fundamental relation between nature-study and industrial education (using the term "industrial" in the broad sense). In an attempt to bring together materials which will show and suggest the possible bearing of nature-study on industrial education, Professor Caldwell, of the University of Chicago, has edited the papers which follow. To the reader it will be evident that the time is not yet ripe for any complete scheme of nature-study on an industrial basis. In fact, some will ask whether nature-study may not easily be made too industrial, especially when the more limited outlook of vocational ends prevail. However, the papers which will follow will set many nature-study teachers thinking, and the editor of THE REVIEW hopes that there may be free expression of opinion and experience. M. A. B.

THE POINT OF VIEW IN INDUSTRIAL EDUCATION

By OTIS W. CALDWELL
The University of Chicago

The extremely active interest in industrial education, and the advocacy of special courses and schools for furthering its needs have brought about diverse opinions relative to the best lines to follow. Some persons have argued for apprentice schools, such as now exist in connection with many large manufacturing organizations, some believe in trade schools in which young people are prepared to work in any one of a considerable number of trades, while a number of those interested (this last group including most of the interested school people) believe that our general educational system should include the basis of industrial education, and that this basis should be had before young people may go into apprentice or trade schools. This latter group of people think of industrial education as an education looking toward general knowledge of and interest in industrial

conditions, intelligent sympathy with industrial life, out of which many will develop the desire to participate therein. From this general course including its proper proportion of industrial education many boys and girls should go to trade schools to fit themselves for a particular industry, the trade school and the preceding grade school making a continuous education for efficiency.

The claim of inclusion of industrial education as an element of the general course, rather than making of it a complete course of itself and one directed toward a specific activity is founded upon good reasons amongst which the two following are prominent:

First, to be most successful in any line of industrial work, one needs good general foundation in a good many subjects of study. A symetrical development may not always be unfortunate, but it often is. A good artisan, whether he be agriculturalist, carpenter, watch maker, railroad or civil engineer needs good *general* education in order that his thinking may have proper orientation. We cannot build the fourth story of a building first, and have it occupy the position of the fourth story unless we introduce much useless and expensives caffolding, and even so, when finished it is relatively inaccessible and removed from the general groundwork upon which other buildings are standing. If we build the fourth story upon the ground it is out of harmony with other ground stories.

Some people look upon industrial education as a short-cut to efficiency and possibly such may sometimes be true. A formal system of education in which are still retained many things that once had meaning in social efficiency, but do not now have, has been justly accused of doing less than it should to put people into sympathetic and efficient contact with the conditions with which these people must live. It does not follow, however, that because of this fact it is best to discard all of this system of education, or the general principles that underlie it.

Secondly, *general* industrial education is needed to develop the knowledge that will enable a worker in one line to appreciate something of the life of a worker in another line. Difficulties such as arise between labor and capital are due to imperfect understanding of "the other man's work." Trade schools into which boys and girls go while in the middle of their grade-school education will be in great danger of helping us toward a condition of caste, since workers in one trade may not have even the

small knowledge of other lines of work, from which any sympathetic understanding may come.

It must be kept in mind that industrial education should exist to make more efficient men and women, not merely to hasten people along to a period when they may become productive in some manufacturing plant. Education should see the boy and girl chiefly, and should see the work to be done as an incident to the highest, useful, intelligent life of the boy and girl. Industrial education should be for the worker primarily; and if this is properly cared for, the work will respond immeasurably more than if stimulated for its own sake. We are in great danger of concluding that industrial education is for the work rather than for the worker.

We should have no fear of the schools becoming too practical, so long as this practicalness is sought through general educational purposes. There is no serious danger but great gain from having children learn in school to produce things of distinct commercial value. Their lives, if worth while, are to be used in producing things that in some way relate to the world's work, and they have better perspective and more ready efficiency if the interests of practical life are recognized. Furthermore young people are better educated under such a system, since the materials of education are such as make possible an appreciable significance of the work.

The different papers in this number of the magazine are not intended to present a continuous discussion of the question of industrial education, but to describe a number of experiments in which the regular work of the various schools represented has industrial aspects.

INDUSTRIAL WORK IN THE NORMAL TRAINING SCHOOL, NORMAL SCHOOL, MACOMB, ILLINOIS

By FREDERICK G. BONSER
Director Normal Training School

A brief statement of our notion of the meaning and place of industrial work in the elementary school will aid in interpreting the spirit and character of the work pursued here.

We believe that a rather fundamental distinction exists between industrial and social education on the one hand, and trade

or vocational education on the other. In the elementary school the emphasis in all industrial and social work is upon its *educative* value; in the trade or vocational school it is upon *training*. Relatively little attention can be or should be given to the development of skill in the vocations in the elementary school. But in the vocational school, skill and productive efficiency in given processes is a large point. Of course it is evident that there must be much of educative value in the work of the vocational school; but the primary significance of industrial studies in the elementary school is to develop power to think, to understand, to appreciate, to see the larger relationships and meanings of the numerous vocational activities as they maintain themselves as vital parts of our life today, and as they have developed from simple beginnings. On this basis it is entirely proper for us to study and investigate the principles of soil formation, soil fertility, cultivation and breeding of farm crops, methods of harvesting, disposition of products, the economics of crop production, the history of agriculture in some of its phases, and the place of farm life in literature and art; but it is *not* our province in this work to teach the boy skill in handling the plow, the hoe, or harvesting machinery. It is our problem to teach the processes of cotton growth, spinning, weaving, and manufacture into various fabrics, these processes as they now are and as they have developed, but it is not our province to teach skill in the use of ginning, spinning, or weaving machinery.

Our industrial work is, in all cases, vitally a part of the common school subjects. The industries supply the raw material for content values in geography and nature-study, arithmetic, industrial history, and the manual arts. The industries may well serve as a fundamental basis and motive for much of the work in these subjects, thereby developing a knowledge of principles and processes in direct relationship to their uses.

Our work fairly well groups itself about three central lines of interest, geography and nature-study, arithmetic, and history. The course of study in geography and nature-study covers the eight school years. The economic motive applies in the selection of materials from the beginning; not as the only motive, of course, but as the dominant element. The school-garden is a large center of interest. In the lower grades the growing of common vegetables and flowers is carried on and furnishes the

material for noting concretely differences in soils, germination of seeds, methods of planting and cultivation, the influence of weeds and harmful insects, methods of harvesting and preparing for market, and methods of preserving some products for future use. These studies of the garden lead out to farm crops. In the first grade last year corn was studied as a food for animals, and as food for man. The children made some corn meal "by hand," cooked it as mush, and served it hot for lunch. Bird studies are made which bring out their economic significance. The chickadee was observed getting its food from trees and the children learned its value to the farmer in ridding his trees of insect eggs and larvae. In the summer quarter the children prepare vegetables from the garden and serve them at luncheons.

The work in the third grade geography is a study of the life of the people of Macomb and vicinity. Local topography in relation to how people live, considering houses, building materials, dress and foods, make up a part of the work. Stock raising, dairying, poultry raising, water supply, fuel, light, factory production in Macomb, farming, fruit growing, roads, transportation, communication (as postal service, telegraphy, etc.), care of the city—all receive consideration, emphasis constantly falling upon geographic controls. An outline in summary of one unit may serve to show how industrial life and geography are vitally related.

> Foods: Plants and animals as sources of food supply. Foods used more in winter; in summer; reasons as far as children can appreciate them. Articles of food made in the home. Visit a grocery store; fruit store; meat market; observe cutting of pork and quarters of beef into roasts, steaks, etc.; bakery, observe setting of sponge. Which articles of food are already prepared when secured? Which need further preparation? Note the large number of people engaged in supplying other people with food. Quantitative considerations furnish valuable arithmetic work.

The fourth year's work leads out through vitally related industries to other parts of the world upon which we are dependent for our life needs. A systematically worked out plan enables the grade to cover the principal parts of the world, every one approached through some life need supplied directly or indirectly by the part considered. Oysters and Chesapeake Bay; Rice and Southern United States; coffee and Mexico; cutlery and England; silk and France; macaroni and Italy; dates, figs, and Persia—are examples indicating the means of approach.

In all geographical study the industrial and commercial phases are kept well to the foreground, but always in relation to their geographic determinants. The eighth grade work is an intensive study of the industrial geography of the United States on a regional basis. Last year, two local industries were studied as types, the pottery industry of which Macomb is a center, and the corn industry, a typical Illinois industry. In the corn study a plot in the garden was used for experimental purposes. Cross-fertilization was a point to be demonstrated. The data contributed by our agricultural experiment station, operated in connection with the State University, are used in the work.

In the upper grades the work in school gardening all looks rather definitely to the development of principles of successful and economic farming experiments—questions asked to be answered by the garden through given or controlled conditions—are a large part of the work. For example, what difference will there be in the growth of alfalfa on two plots, one inoculated with proper bacteria, the other not, was answered by sending to Kansas for one quart of inoculated soil which was properly mixed with the seed sown on one plot, and comparing results as they developed.

Since this is a section well adapted to fruit growing, we have begun to furnish a garden with berries of various kinds, grapes, apples, pears, peaches, etc., by which aid may be given in teaching proper principles of fruit growing.

In nature-study in the intermediate grades much of the work is directly related to industrial life. Meteorology is approached through its importance to farm crops. Trees, plants, birds, insects, machines—whatever the subject of study in this field—relation to life needs is a fundamental motive of approach.

For arithmetic work the quantitative side of industrial life furnishes an abundance of material. The manual arts work in all grades; the quantitative side of the pottery industry; the cost of paving a new street in Macomb; the economics of the corn industry; problems in rainfall; making a barometer; conditions under which it will pay to keep a cow, or poultry, or a horse; whether it pays to drain land, to burn corn stalks, or to sow clover; the cost of a dinner or luncheon given by the children—these are some of the questions whose consideration provides motives for number work and gives larger meaning to the in-

dustries taken up. All these and many others of similar nature were used last year with very gratifying results.

The history, or social life study, continues in our school throughout the eight grades. The first year's work is a study of the occupations of the people of our own community. Ideas emphasized are those of vocational dependence and interdependence, and of ethical relationships. The later grades study various stages of life in the order of man's industrial and social evolution. Industrial needs, activities, and products are especially emphasized throughout, and many pieces of hand work illustrative of processes are accomplished. Some basketry and weaving, pottery, traps, costumes, implements and weapons, models of houses, stained glass windows, furniture, preparation of foods, and numerous other illustrative pieces of work are taken up, not for their value as finished products, nor in any large measure for their value in developing skill in hand work, but because they develop an insight and appreciation of the industrial and social life of the people studied. Comparisons with present-day life, industry, methods, and products are constant. The aim is to make these studies throw light upon the present, not to become a substitute for it. History work and industrial geography are kept in very close correlation. Various significant manufacturing industries—cotton, wool, lumber, iron, and others—are studied in their historic evolution, in their geographic distribution and controls, and in their influence upon the life of man.

From the foregoing it may be seen that the industrial side of life receives a very pronounced emphasis in this school; but that this work is all in close and vital relationship to the common subjects of study. The industries of most significance to our people receive most attention. But none of these interests are considered from the standpoint of developing skill or technical efficiency in any given process. Our clientage does not demand of the school vocational training during the elementary school period. But it does demand, perhaps implicitly rather than explicitly, breadth of interest, understanding of relationships, and appreciation of conditions and problems in the industrial and social phases of its life. To furnish these is the aim of our emphasis upon the utilitarian activities of our community life. We make these basic for all the other elements of culture which, we believe, are duly appreciated in our work.

WHAT THE STATE NORMAL SCHOOL AT MACOMB, ILLINOIS, IS DOING IN AGRICULTURE

By J. T. JOHNSON
In charge of Biology and Agriculture

It is very evident to any one who has ever traversed even a part of the territory known as the Military Tract in Illinois that the leading industry is agriculture. Surrounded as it is by a rich agricultural district, the Military Tract State Normal School ought to be and is interested very much in the general subject of agriculture. The natural environment suggests it, the young men and women are many of them anxious to study the new subject, and the school desires to encourage such training, and has accomplished something already in a very substantial way. However, it is thought at present that a beginning only is made, for the possibilities are large.

In this brief description it seems quite out of place to mention future plans and, therefore, only the work actually in progress will be herein set forth. Briefly the work may be considered in the following, viz., (a) Class, (b) Experiment Field, (c) Agricultural Club, (d) Teachers.

Class. There are given each year two terms of work, one term in the Spring Quarter and the other in the Summer Quarter. At present the course is offered as an elective to students of normal school grade, and to teachers who enter the Summer Quarter.

The class-room work provides for a general treatment of the subject. Usually one of the leading texts in elementary agriculture is used as a basis, and to this are added bulletins, circulars, and similar publications from our State Experiment Station, and also Farmers' Bulletins, and the Yearbooks of the Department of Agriculture, Washington, D. C. Among some of the very best references are the Reports of Illinois Farmers' Institute. Laboratory practice supplements the work of the class-room. The exercises employed are those which bear upon the important principles discussed in the various publications. It probably would be much plainer to say that exercises are used which involve the composition of soils, the relation of moisture to soils, the conservation of moisture; which treat of the composition and home mixing of commercial fertilizers, and of the value of

farm fertilizers; and which illustrate by means of pot culture and other indoor experiments. In addition to the laboratory practice, which requires about four hours per week, the students are required to observe and report upon the forty experiment plots in the Experiment Field. While this does not in any respect describe all of the laboratory work in any phase, it is hoped that sufficient has been said to suggest the general nature of the work as outlined in the course.

Experiment Field. The Experiment Field consists of forty plots each one square rod in area, and each surrounded with a strip one-fourth of a rod in width. It is seen then that each square rod thus surrounded is a unit in the general experiment. Just enough of the plan of experimentation will be given here to afford a general idea. The entire forty plots are divided into two divisions each containing twenty plots, one division illustrates one type of agriculture called grain farming, and the other division illustrates another type of agriculture called mixed, or live stock farming. Each division is subdivided into four series of five plots each. Upon the four series of each division, four crops are grown each year in the rotation corn, wheat, oats, and clover. With the exception of the first plot in each series, each plot receives treatment with one or several fertilizers according to the plan. There are represented upon this small area forty experiment plots each differing with the others with at least one condition. Some very valuable data have been gathered from this source within the two years of its existence and with increased accumulations increased importance is to be attached. It will be unnecessary to say that the Experiment Field is a very valuable adjunct to the courses in agriculture.

Agricultural Club. The club is formed of the young men in the school who have an interest in agriculture. Membership in the club is purely voluntary. The only qualification is sufficient interest to attend the regular weekly meeting. There were fifty-six members during the Spring Quarter. The purpose of the Club is to furnish an opportunity to express themselves freely upon such topics as may naturally rise in their general reading and thinking. It further furnishes new matter for consideration because definite subjects are proposed for discussion and each member usually speaks with freedom. Its members assist very materially in the care of the Experiment Field. This year

they applied the fertilizers and seeded the fall wheat with the necessary preliminary preparation of the seed bed. The Club is now co-operating with the local county Farmers' Institute which is to hold its meetings at the Normal School at an early date.

Teachers. Probably the most gratifying results yet attained in this school is that which is being done by the teachers who have taken the course in agriculture and who are now teaching it as a part of their regular school work. Many interesting things have been brought to notice by these teachers either in personor by letter and in no instance has there been a discouraging report. The Normal School aids either through correspondence or by personal visits, those teachers who desire assistance.

INDUSTRIAL WORK IN THE STATE NORMAL AND TRAINING SCHOOL, OSWEGO, N. Y.

By AMOS W. FARNHAM

It is not the purpose of this article to discuss the relative merits of industrial work in the school course, nor its claims to the consideration of students of political economy, commerce and labor, and the fundamentals of good citizenship; but simply to present briefly the industrial work as it is pursued today in the Oswego State Normal and Training School, with its aims and ends.

The work in some form is introduced in the first year of the school of practice and continued in different forms throughout that course, which includes kindergarten and all other grades below the high school; then industrial work, more advanced and more difficult, is extended through the "Normal High" and professional courses. None of the work is in a strict sense vocational, but all of it attempts at least to provide instruction in fundamental industrial knowledge.

The children of the kindergarten engage in hand work common to all kindergartens: *sand moulding*, in which the geographic setting of certain kindergarten stories is represented; *clay modeling* which produces models of many forms of absorbing interest to the children, such as birds' nests containing eggs, candle-sticks with tapers, peanuts, firecrackers, etc.; *paper folding*, producing forms of baskets, birds, boats, etc.; *outlining* simple forms of familiar birds, quadrupeds, plants, buildings,

flags, and other easily traced objects of interest in story work; *construction*, through the use of cardboard, of boxes, calendars for "grown-up" friends, match scratchers, etc.; and different phases of elementary *drawing*. These and other forms of industrial work furnish legitimate outlet for the children's acitvities, give better expressions of ideas than words possibly can at this stage of school life, satisfy the constructive nature, accustom the hands to do the bidding of the mind, and develop skilled manipulation.

Clay modeling and different phases of drawing are continued through the grades (nine years), and sewing, basketry, and woodworking are introduced.

More work is done with clay and in more grades than is done with any other material in our school. It can be introduced earlier and continued later. It lends itself to the making of a marble, and to the modeling of a Mercury.

"Clay is plastic—can be made more or less so as the needs of the class demand. It is durable—can be used over and over again. It is not easily spoiled by one false move in handling. Mistakes can be easily corrected. Clay does not require the use of fine tools, nor great skill in the use of any tools. It is inexpensive, clean, and easily cared for. Modeling gives a more exact reproduction of form than drawing gives, because in modeling one deals with the three dimensions, just as they are found in the object modeled."

"The aim is not utilitarian, æsthetic, nor ethical, but all three combined, and we call it educational."—From "Notes on Clay Modeling," by Miss Harriet E. Stevens, Oswego Normal School.

In sewing and basketry, boys and girls do the same kinds of work up to the fifth year. The work consists of:

(a) *Weaving* of rugs and iron holders of raffia, yarns, and rags, on simple looms made by the children. On circular looms, brush-broom holders are woven of raffia, and ornamental designs are put in with colored raffia.

(b) *Winding* picture frames of different forms, napkin rings, and fancy boxes. These articles are made of straw-board and wound with raffia.

(c) *Braiding* lamp mats, brush-broom holders, and hats of raffia, and sewing them in the desired shapes.

(d) *Knotting* shopping bags, twine bags, and hammocks of raffia and macramé cord.

(e) *Coarse sewing;* making iron holders, marble bags, bean bags, and mats of burlap. Ornamental designs and initials worked in raffia or silk.

Beginning with the fifth grade and continuing to the high school the girls take up fine sewing and basketry, and the boys chair caning and woodworking.

Fine sewing consists of dressing dolls and making garments for themselves. While darning and patching may not come under fine sewing, they are done so neatly that fully as skilled use of the needle is required as is required for fine sewing.

In basketry reeds are used to make work baskets, jardiniere baskets, and scrap baskets; ash splints to make handkerchief boxes and measuring baskets; and willow to make melon-shaped baskets.

Miss Mary L. O'Geran, of the Oswego Normal School, in her Notes on Sewing and Basketry says: "The purpose of sewing and basketry in the school is to train the children in action as well as in thought, and to help them to interpret their environment and to become efficient members of society. An efficient person is one who can *do* as well as *know*. Because a girl is taught to sew or to make a basket, it is not to be supposed that she is to follow the vocation of seamstress or basket-maker. Sewing and basketry are factors of the educative process."

"The objects made should be of some practical value, and should awaken interest in some of the more general human industries."

Woodworking in the grades consists of making match strikes, match-boxes, whisk-broom holders, shelves, coat hangers, bread-cutting boards, tooth-brush holder and shelf combined, towel rollers, book racks, key racks, inkstands, windmill vanes, foot stools, floor-broom holders, blotter pads, knife boxes, camp stools, picture frames, counting boards, sweet-pea racks, umbrella racks, and jardiniere stands.

Woodworking in the high-school and normal grades involves the manufacture of chess boards, artistic boxes, folding screens, combination desk and bookcase, corner and medicine shelves, plate racks, magazine racks, picture frames, sleeve boards, and tabourets.

That this line of industrial work may be more intelligent, studies of the different materials are pursued, such as the distinguishing characteristics of cabinet and building woods, and adaptation of different woods to the uses of the articles made; the making, grade, and use of sandpaper and glue; brads, nails, and screws; burnt umber, burnt sienna, shellac, and varnish; wood finishing, etc.

Quoting from "Educational Woodworking for Home and School," by Joseph C. Park of the Oswego Normal School, "The importance of industrial work, as a subject which helps to give definite ideals of the value of toil and of the real worth of things that are made by the sweat of the

brow, cannot be overestimated. The rich boy works along with the poor boy, each endeavoring to produce something which will express tangible results. Manual training work to be valuable must be strenuous. Boys must be made to plane and saw and *sweat*. They must produce shavings that have the artistic curl of the craftsman, not meaningless chips. Shop-work should give ability to plan and execute work according to good technique."

The school is fortunate in possessing a garden containing an acre of land. Here the elements of agriculture are taught. All of the more common plants of commerce are produced. Among them are wheat, rye, barley, oats, buckwheat, rice, millet, sorghum, broom corn, field corn, sweet corn, cotton, hemp, flax, tobacco, sweet potatoes, peanuts, castor beans, sugar beets, hops, and some forage plants[1].

The growth of these plants is a revelation and an inspiration to the children. The products are used to illustrate lessons in geography, to furnish materials for drawing classes, and to decorate the class-rooms.

THE PHYSICS OF INDUSTRY

By C. R. MANN
The University of Chicago

The problem of teaching physics to pupils of the grammar schools has been attacked from several points of view. In some of our large cities, for example, there are given to the seventh and eighth grades courses resembling in general outline and methods of treatment those called physics in the high schools,—a sort of low potency high-school course, as it were, just as the present high-school course is a "diluted and highly peptonized" college course.

During the past year an experiment was tried in the University of Chicago Elementary School for the purpose of finding out whether a course in physical science could not with advantage be built up from the point of view of the industries rather than from that of the college.

The general topic chosen was heat. The class, consisting of four sections of about sixteen members each, both boys and girls, were occupied for several periods by informal discussion of their general information about heat, what it does for them, and what they would like to know about it. As a result of this

[1]See article by Professor Farnham in this magazine for March 1907, vol. 3, 76-85.

discussion, the class decided that it would like to construct thermometers, in order to be able to make measurements of temperature and be able to answer their own questions.

This piece of work lasted several weeks, but at the end of that time each pupil was the proudand happy possessor of a thermometer of his own manufacture. During the process of making they had learned something of glass blowing, and had begun to clarify their notions of temperature, boiling point, and melting point. They had reasoned out the fact that thermometer scales were arbitrarily selected for convenience; they had found that ice and boiling water remain at constant temperature through change of state, and had seen that heat is required to produce melting and evaporation. They were, however, unable to grasp the idea of heat quantity as measured in B. T. U.; for them a quantity of heat was simply so many degrees on the thermometer.

In filling the thermometers mercury, water, alcohol, and air were used for thermometric substances, and their various advantages and disadvantages discussed. They reasoned out the conditions that must be fulfilled in making thermometers that should be very sensitive through a small range, or good for low temperatures only, or for high temperatures only, or for a large range of temperatures.

When all the instruments were done, they were hung on the wall together and readings taken for several days. Of course the readings at a given time differed among themselves by 10 or 15 degrees. Although the question as to how to find the right temperature from all the thermometers which gave such different readings at first showed that each child thought his own was correct, one or two bright ones eventually suggested that taking the average of all the readings would give the most probable value. This was done, and the average agreed very closely with the reading of a standard thermometer.

When the thermometers were completed, the manufacture of a hot-water heater was taken up. This was made from glass tubing and corks, each member of the class making his own design, generally copied from the one at home. It is probably not necessary to enumerate the important physical ideas that are involved in this device. Nothing was ever said to them about laws, they simply observed and absorbed knowledge of how the water acted under the conditions they created.

When the water heater was completed and thoroughly discussed, and after the various patterns had been compared and criticised, the class took up the problem of converting salt water into fresh water by distillation. After careful questioning, the class worked out the conditions that the still must meet, and then each member proceeded to construct one from flasks, corks, and glass tubing. The designs were not all alike, some condensing the steam in a bottle placed in a large jar of cold water, others having a steam pipe passing through a jacket through which in turn cold water was kept running.

After the stills were running, the class was asked whether it was cheaper to distill their own water with their own still and pay for the gas used at $1.00 per 1000 cu. ft., or to buy distilled water from the druggist at 10 cents a gallon. They reasoned that they must measure the gas consumed, and so a gas meter was introduced and fully investigated. Each then in turn measured the consumption of gas per hour for his own burner and the amount of water distilled by his own still in the same time. The results of these measurements gave widely different efficiencies for the stills, and this fact lead to a comparison of the more efficient with the less efficient and a discussion of the conditions on which efficiency depend.

Each child was required to hand in at the end of each experiment a written report of his own work.

POULTRY RAISING AS A SCHOOL OCCUPATION

By W. A. BALDWIN
Principal of State Normal School, Hyannis, Mass.

Ever since Comenius said "Things before words" there has been a growing demand for some kind of physical activity upon which to base the so-called "regular work" of the schools. At first one form seemed as desirable as another. Even so wise a man as Dr. E. A. Sheldon, Principal of the Oswego Normal School, used to say that it mattered little about the kind of work so long as it was objective. We have been gradually coming to see that it does matter very much, and that the right kind of work must possess the following, among other characteristics, viz:

1. It must fit into the needs of the community of which the school is a part so that children and parents may see that it is of practical value.

2. It must give opportunities for the child to participate in the work and in the rewards of his work.

3. It must furnish opportunities for typical, basal experiences and so to build up important apperceiving concept groups.

4. Things must be seen by the children in their natural relations, and ministering to the life of man.

5. It must furnish a basis for natural correlation with the regular subjects.

In a section like Cape Cod, already known in Boston and New York markets for its fine Cape Cod eggs, and in a school like our Training School nearly every child of which may have a few hens at home, this poultry industry seems to meet all of the foregoing requirements. I have felt for some time that poultry raising, properly conducted might furnish a school activity equal in value to the school-garden. We have, therefore, started the experiment to see how much of this work may be safely recommended to the regular public school.

We have a small plant fairly well established and incidentally have done a little educational work of the right sort. Thus far this has been done almost entirely in connection with the Normal School. We hope gradually to find points of connection with the Training School.

In the winter of 1907 a Cyphers incubator was purchased and I began to experiment with it. The incubator was placed in my library with an experimental batch of eggs. My two little boys, aged respectively 9 and 10 years, watched and assisted in the turning of the eggs and in the care of the incubator. They heard the first faint peeps from the imprisoned chicks and watched with the greatest enthusiasm to see the little fellows struggle out of their enclosing shells. After all were hatched these chicks were transferred to a Cyphers brooder which was placed on our lawn. The children considered it a great honor to be allowed to help care for them.

The incubator was now transferred to a small house which had been used for the school-garden tools and a part of which had been partitioned off by one of our students to serve as an incubator house. This house was built into a sandy hillside and so it

was possible to have an incubator room in which a very even temperature could be preserved.

The business of incubation was now turned over to an energetic, faithful teacher and the incubator was kept going at its full capacity for two successive periods. It was found convenient to utilize some of these eggs at different stages of their development to illustrate normal school work in biology. When the chicks began to hatch out the students were taken in groups to watch the process and they showed almost as much enthusiasm as my boys had shown.

After being transferred to the brooders the chicks continued to be centers of interest not only for the whole school but for visitors to the school. The question now arose as to what should be done with these chicks after they should outgrow the brooders. Here was a new problem. We must have a hen-house and we had no money for that purpose. We visited local poultrymen and obtained printed suggestions from the Cyphers Incubator Company, from the Agricultural Department at Washington and from Orono, Maine.

We decided to make this our manual training work for awhile and to build a poultry house after plans similar to those described in "Poultry Investigations at the Maine Agricultural Experiment Station, 1906." The School had recently constructed a coal pocket out of reenforced concrete and had saved the lumber and some stones from the same. We dug into the south side of a very sandy hill and erected a strong retaining wall six feet in height, facing it with concrete. We erected walls of concrete two feet high on the other three sides and made a slightly sloping floor of concrete. We next erected our frame, covered it with the boards and these with shingles. The concrete work was done in the spring, principally by the men who care for the school grounds under the direction of a first class mason. The framing of the building was done during the summer mostly by instructors and members of the manual training class of the summer school. The shingling and a part of the interior construction was done during the autumn by the instructor and the normal school students. As winter was fast approaching it was found necessary to have a carpenter finish up the work.

This chicken house had thus furnished an excellent kind of manual training for the men of the school. I do not believe that

it was an *excellent* kind for the young women, but it was much better for them than is the ordinary wood-working course. In fact, many advantages might be urged for it, not the least being that here was an urgent need for which they might help to provide.

As soon as the house was ready the fowls were installed in their new and comfortable quarters. I was absent in Europe during the winter and so can only write what has been reported regarding the results. The fowls were put into the keeping of successive Normal School students, each anxious to help to earn his way and willing to get some experience in poultry raising. The instructor who was in general charge found a great difference in the quality of the work done by different students. Certain very important characteristics which were not suspected from the regular school work were clearly manifest in the poultry house. In fact, enough has already come to me along this line to prove that here is a new and reliable means of applying practical tests and of helping students to see and to correct inherent weaknesses which might never appear in the course of regular school work.

In connection with the incubation such points as the following impressed themselves upon the students: Very much depends upon the ancestors. Eggs should be obtained from a reliable dealer who has standard fowls of a high grade. The general health of such ancestors must be good. Both the cock and the hens must be in a vigorous condition at the time of the egg production. Even after exercising the utmost care in these matters some eggs are not fertile and others cease to develop at various stages of the incubation period. Some chicks break through the shells but have not sufficient vitality to free themselves from them. Others are so weak after struggling from their shells that they are trampled upon by their more vigorous fellows. The greatest care must be exercised during the period of incubation to keep an even temperature and to prevent any jarring of the eggs. The young chicks must be fed enough but not too much, and must be given some hard food to provide work for their digestive organs. They must be given plenty of fresh air and exercise, not too much heat, and opportunity to gradually accustom themselves to the cold air and other conditions outside their brooder.

All of these ideas and many more furnish to the Normal School students very forceful lessons which have direct application on the hygienic side of their own every-day lives.

Although not much connection has as yet been made with the children of the Training School, I have myself gained some ideas of possibilities along those lines by the experiences of my own children. I have already related some of these.

After seeing their father experiment with the incubator, my boys were anxious to try raising some chicks. We discussed matters at some length and finally it was decided that the older boy might try running a small incubator which I had purchased, and that the younger should set a hen. Each was interested in the experiences of the other and so both became well acquainted with the different stages of both methods of chicken hatching.

When the young chicks were transferred from the incubator to the brooders a few were thought not able to fight their way with the others. My boys asked for several of these unfortunates. They fed and watered them; put them out into the sunshine in the morning and behind the stove at night. They tried to straighten crooked feet, and expended a vast amount of sympathy upon them. Some died and were buried with tears; others grew to be valuable members of the hen colony.

As a result of these chicken experiences and of various garden experiences they are glad to try for this winter (1908–9) the following plan: Each boy has charge of a flock of hens and a cock, one flock consisting of Rhode Island Reds and the other of Barred Plymouth Rocks. The hens are furnished; the boys do all of the work, pay for the food and sell the eggs. Each boy will have half of the profits from his flock. The lessons which they are learning could not be so well learned in any other way and they are lessons which are becoming a valuable part of their equipment for life.

It is true, as someone objects, that such training cannot well be given to every child at school. But the school can do much. It can help to cultivate the right attitude toward this kind of work, and nearly every family in our villages and in our small cities would find it profitable, pleasurable and educational to teach the children how to care for a few hens.

"They knew, as God knew, that command of nature comes by obedience to nature; that reward comes by faithful service * * * There was no secret of labor which they disdain."—*Emerson.*

NOTES ON INDUSTRIAL EDUCATION IN RURAL COMMUNITIES

By C. H. ROBISON

State Normal School, Montclair, N. J.

In spite of the title of the "Committee on Industrial Education for Rural Communities," which reported to the National Educational Association in July, 1905, there is still a strong attempt on the part of many persons, interested primarily in the city phase of the subject to appropriate the term "industrial education" for training along the lines of those vocations peculiar to city life. This smacks so strongly of the Wall Street use of the term "industrials" that it deserves to call out a protest. Since agriculture is our greatest single industry, it seems no more than fair to insist on the use of the term "industrial" as the more generic, covering this as well as other forms of education pertaining to the more or less manual but no less dignified vocations. It is a pity that the genius of our language does not easily permit of the coining of terms as useful in our present situation as would be the words "urbindustrial" and "agrindustrial" or "rurindustrial."

The term industrial is often used as a synonym for manual training in its original sense, simply because it seems a more up-to-date term and has an imposing sound. This is somewhat like the fad for using the term "physiography" as synonymous with the older and more inclusive "physical geography," of which it is really but one department, though the most important one. Another case in point is the use of the word "educational" in place of the tabooed "pedagogy."

It has been pointed out that there is this fundamental difference between industrial education in the city and in the country. In the city the danger arising from specialized industrial conditions is that the workman will become narrowed, held down to but a single process in his employment. Manual training has sought, or has aimed to seek in the past, common elements in the various trades that would give a boy a start towards skill in any one of them. But now it is coming to counteract this narrowness and to broaden the employe's outlook on general industrial fields.

On the other hand the agriculturist must have a very wide range of knowledge in order successfully to carry on his business. He is not in danger of the same narrowness, so far as a single manual or mechanical operation is concerned; so that an agricultural education may be as broadening as the ideal industrial education in the city and, at the same time, bear directly on his business.

Where the city boy learns the use of carpenter's tools to "co-ordinate muscular activities," "train the eye and hand," "become handy about the house," etc., the country boy, being an important hand on the home-place has immediate need of ability to make real chicken coops, to mend real fences. I have been uable to see just why the sons of brokers and railway auditors, or even of machinists, spent two hours a week with toy forges or made make-believe castings of lead, unless it was to teach a general industrial process and incidentally vary the work of the gymnasium. But the country boy often has real harrow teeth to fix, real whiffle-tree irons to make in order to save half-a-day's journey to town.

We are so accustomed to associate a manual training department with electrically driven lathes, and other expensive fittings, that we overlook the growing amount of real manual training work that is being introduced into village and consolidated rural schools. One principal told me this spring he had considered it hopless to attempt to introduce manual training into his school because a fellow principal in a neignboring manufacturing center had told him the equipment would cost $7,000. But the teacher of agriculture in the same school was having the children make brooders at home as best they could to care for the chicks hatching in the incubators loaned the school by farmer patrons. I saw a manual training department in the school of a central Ohio village with four home-made benches, each with an outfit costing not over $20 while the entire equipment did not cost over $100. The "plant" was installed in a one-room cottage near the school; and the boys seemed to be getting an immense amount of satisfaction out of it. Much of their work was related to their home life.

It is certainly a mark of progress and an encouraging sign to find in a school three miles from the nearest postoffice, and that only a hamlet of two or three stores and a station on a "coal-

road," such a combination of education along the lines of agriculture, domestic economy, and manual training as I found at the Magnolia township school, Putnam County, Illinois. Here on a fine 24 acre campus stood a new $12,000 school-house that had been built without cutting down more than two of the trees growing on the place. Several acres are devoted to experimental plots under the general supervision of Professor Hopkins, of the State University and under the direct management of a local corn breeder of some reputation. The school has its own gas plant, which lights the building and supplies the domestic and physical science laboratories. It is heated with steam and furnished with running water furnished by an air pressure pump. There are accommodations in the basement for 20 in manual training. While there are but four teachers, they are specialists to a degree allowing of more work of departmental nature than often found in schools of small cities. When the high school has been running four years instead of two, more teachers will be needed to keep up this arrangement. Agriculture will be taught in each of the four years.

However much some may be inclined to criticize the work of the county agricultural schools of Wisconsin along the lines of traditional culture, they offer excellent opportunities to the youth of their respective counties to obtain an industrial training very well calculated to meet their particular needs. I mention these schools because already in three out of the four counties maintaining such schools, the county training school is housed in the second story of the modern and commodious building, and has the full benefit of all the facilities for industrial training for both the young men and young women. Two of these county training schools for teachers report, for the year 1907–8, an enrollement of 73, of which about 70% will probably teach in the rural schools of the respective counties.

The different examples cited above are isolated cases of industrial education in rural communities, and can hardly be said to show current tendencies so much as possibilities and to indicate methods of action.

A POINT OF VIEW IN NATURE-STUDY

By JOHN WILKES SHEPHERD
Chicago Normal School

1. Nature-study is not science, but is scientific. Two things tend to confuse nature-study with science: First, both may, and in fact generally do, deal with the same material; and secondly, nature-study had its beginning in, or originated from science.

The fact that two subjects deal with the same material does not argue that they are in the main alike, in fact, they may be very different. For example, two persons may be examining the same tree, one studying the trunk with reference to its hardness and brashness and the other with reference to its function in the life of the tree. Both study the same tree, nevertheless one studies physics and the other botany. Again, two people experiment with the same piece of crayon, one tests it for color, smoothness, and adhesiveness, the other determines its composition. The first is an artist, the second a chemist. Or again, suppose I am studying a particular plant, can you tell the branch of science with which I am dealing? Not at all. I may be studying physics, I may be studying chemistry, or perhaps physiology.

The second point is rather more subtile than the one just considered, because we almost instinctively ask ourselves how it is possible for one thing to come from, or be a product of another and yet very unlike it. The possibility requires time, requires development. Our modern, large, delicious apples are no doubt very different from the original wild apple. Our own republican form of government probably has its roots in a monarchy. An example that more nearly illustrates the point with reference to nature-study and science is to be found in the origin of the science of chemistry. So far as we can discern chemistry seems to have had its roots in the sorcery and magic of the olden time, yet nothing can be farther removed from these than the science of chemistry to-day. Furthermore, in its earlier stages of development chemistry did not have an existence of its own but lived only to serve in turn alchemy and medicine. Out of its existence as a tool, a servant, there developed the science of

chemistry with an independent aim of its own. This exactly parallels the history of nature-study.

In the example of the crayon we may ask why the same piece may serve both the artist and chemist, or why the same tree may be used as a study both in physics and botany. The answer is that it depends on the way we think it—our point of view—the ends it serves. And exactly so with nature-study and science; they do not serve the same end, they have different aims. Science finds satisfaction in explaining material results in terms of material causes,—it searches unceasingly for cause and effect relations in the physical world. Science (so-called pure science) functions in knowledge, in knowing, nature-study in something else. (It might be said in this connection that probably the greatest value in science is not its conclusions,—the knowledge it furnishes but rather the methods used in reaching these conclusions,—in obtaining its knowledge).

Some two or three decades ago biology was working in the field of classification and children in the elementary school were taught the names of plants and insects, their parts, etc., in order to be able to do more botany or zoology in high school and college. The same general plan obtained in the elementary school as in the secondary school and college, namely, at least a few specimens were provided for dissection and demonstration. This was the beginning of the nature-study movement. The work of the children was called nature-study, which meant an elementary study of things which would later materially benefit especially botany and zoology. In other words the work with the children was to produce a sub-soil for science. In a few years the secondary schools and colleges provided each student with material for laboratory study, and correspondingly the elementary school urged specimens for each pupil. Within the last decade rapid changes have come to this servant of science. Instead of children being furnished with material for study they sought it out in its natural surroundings. For example, fruits, twigs, and flowers were visited and studied unplucked. *This contact with the living, growing thing caused a change in the attitude of the children.* They were no longer content with pulling plants to pieces and learning names that had no special significance to them, but as they became interested in the live, growing plant, their interest became involved in the growing of the plant.

From a harmless acquiescence in the work of plants the children became positive factors in their production. The work was to function in *doing* something. The servant, nature-study, then became free and had from that time an existence of its own.

It was, and is, no longer a servant of science, but has a distinctive aim of its own. Science aims at *knowing*, nature-study, at *doing*. Knowing in science is the end, in nature-study, a means. A botanist studies flowers in order to know them, the children study them in order to grow them—and the most valuable part of the study is in the growing of them. The scientist studies the lever in order to determine the mathematical relation between power and load; the nature-study pupil studies the lever in order to use it and see it working in the construction of buildings, etc. The scientist studies the electro-magnet in order to understand it, the pupil in nature-study, in order to use it. Science seeks the material cause of material effects, nature-study, the production of these effects.

The studied production of material effects necessitates careful investigation, a close adherence to facts, conclusions freely open to revision—all of which come naturally in the production of the effects. For example, a group of children wish to grow the best possible specimen of a plant. They will learn in the growing of it that the plant requires water—more than that—something of the quantity needed from time to time. They will probably conclude from their experience that all plants need a like amount of water. This conclusion, while based on experienced facts, may need revision when applied in the growing of some other plants. If so, the revision would be a most valuable one for it brings the children face to face with themselves in a contradiction. Such experiences would help them form the habit of carefully weighing facts, of forming conclusions from *all the facts* in hand, of willingly changing conclusions—but only in the light of new facts. This form of thinking, this spirit of investigation is native in both science and nature-study, and is scientific. Therefore, while nature-study is not science, it is scientific.

II. Children should provide material and use it. Nature-study in our schools should furnish children with an opportunity and a desire to *do*, in which doing the children work with material. It is the function of the teacher to see that the opportunity and desire are furnished. Not only that, but she should see to it that

the children help furnish the opportunity when possible, and this effort of theirs constitutes an essential part of their doing.

Sometimes to furnish an opportunity for nature-study work means, in part, the gathering of material and making of simple constructions. The providing of material, making of apparatus, etc., which utilize and enrich their manual training experiences, thus should become a legitimate part of the children's work and at the same time it will lessen the demand on the teacher.

Unfortunately most children will bring material or perhaps go on excursions just because the teacher tells them to do so. In general,it would be better for all concerned if the children brought no material than to bring it for the reason cited. Children should be given credit for coming without material under such conditions. The providing of material simply because the teacher has directed that it be done is unfortunate for two reasons. First, the children's stimulus is the wrong one; and secondly, their subsequent work with this material is apt to be largely mechanical.

The *quantity* of material provided by the children is not a safe index of the quality of nature-study work being done. The value depends on the motive which actuates the bringing. A good test to apply would be: Did the children bring the material because they wanted to use it? Most of us may have seen great numbers of plants in the schoolroom serving no other purpose than as mute reminders of a bit of manual labor.

Far more important than the fulness of opportunity for nature-study would be the desire on the part of the children to work with the available material, even if there were but little of it. This condition can be realized when, and not before, the end which the teacher intends for them to attain becomes their aim from the beginning. In realizing the aim, problems appear, and in the solution of these problems the children help furnish, and then work with, material. For example, suppose in connection with physiology the teacher wants the children to know what food materials are starchy. Instead of bringing in food materials herself or having the children do so she should furnish a stimulus to the children to want to know. When they want to know, one of their first problems is how to determine starchy substances and when this has been ascertained the rest is simple. The children will gladly bring foods and food-material from home in

order to make the determinations; moreover, they will make tests at home.

If the teacher of nature-study will make sure that the problem she wants the children to solve becomes their problem, then her work is already largely done and she will have done the most valuable thing towards furnishing opportunities for, and a desire on the part of children to work with, things in nature-study.

III. Nature-study and Industrial Education. If industrial education may be viewed as including education by means of the materials of the industries, then nature-study is well adapted to this end. For example, in the rural schools the boys could take corn, wheat, and other grains to school and experimentally determine the best lot for seed purposes, and the girls could make similar tests with radishes, lettuce and other garden products; also the reason for, and various methods of, preserving fruits and other food materials. In city schools the work would be of the same quality but with different things. In cities the children could make first-hand studies of building materials, lighting, heating, and local transportation; preparation and preservation of fruits and vegetables found in the local grocery stores. Also by means of window-boxes at school and school-gardens they could try to determine the best two or three varieties of plants for window-boxes at home, in back yards, or upon lawns; they could grow several varieties of radishes and other vegetables in order to determine which they think would be best for market gardening.

A SCHOOL MUSEUM

By WILLIAM H. HUSE
Manchester, N. H.

The city of Manchester, N. H., is not as well supplied with museums as are some cities, in fact, there is no public museum at present in the city worthy of the name. It was partly because of this fact and partly because of the feeling that a museum for school use should be in the school itself, that a few years ago the Hallsville grammar school set about collecting specimens for the illustrating of the geography work. The collection at present occupies two cases, each twenty-one feet long and six feet high, on opposite sides of the upper hallway, besides several closets and shelves that hold an overflow. These are all crowded at present, but serve their purpose. The specimens include mineral and vegetable products, both natural and manufactured, all that can be obtained. Animal products are also included and are used like the other specimens in class work. The cases have glass doors so that the specimens, most of them labeled, are visible at

One of the cases, 6x21 feet, in the Manchester, N. H. School Museum.

all times and any day after school hours children may be seen inspecting them. Every teacher who teaches geography has a key to the cases and uses the specimens at her discretion, replacing them when the class is done with them.

The different industries are represented as completely as possible, and give a foundation for text-book study that could not be obtained in any other way. The study of local industries always, when practicable, includes a visit to the mill or shop as well as the inspection in the class-room of the manufactured products. The fields and woods are also visited as much as possible. These trips are regarded as an essential part of the geography and nature work.

The compound microscope is used as much as possible in the study of fibres and the other materials that have a story to tell under the lens. The little barbs on wool that can be seen only when magnified, show why this fibre can be used in the making of felt, while other animal fibres cannot. The different starch grains are easily seen and some discoveries have been made. Some laundry starch supposed to be from potatoes was found to be corn starch and then enquiry showed that the latter was the cheaper of the two, which explained things. Some buckwheat flour was inspected for the purpose of seeing its characteristic starch grains. They were found as were also about as many grains of wheat starch. The conclusion was evident.

A collection of about four thousand lantern slides is used continually in geography work and with these a life can be put into the study that it lacks without them. There are pupils in every school who have more or less difficulty in getting clear ideas from the printed page and these are benefitted immensely by the stereopticon, while with all the pupils the slides give a vivid impression of unvisited lands that the text alone could hardly do.

Laboratory work and museums have for some time been considered indispensable in high-school and college work, but is a comparatively new thing in the elementary schools where it is much more needed. This is a work that this school is trying to do. It is also trying to work along the line suggested by President Hyde when he said it is not what we know but what we love that is of use to us when we get through school.

A UNIQUE NATURE-STUDY INSTITUTION

The editor of the *Guide to Nature* sends the following announcement of plans for a unique nature-study movement in Connecticut, under the auspices of the Agassiz Association. The announcement certainly suggests great possibilities, especially for the correspondence and editorial work of the Agassiz Association. The movement will be watched with great interest by all naturalists who believe in popularizing scientific studies.

IMPORTANT ANNOUNCEMENT:

Good news to all Students and Lovers of Nature and to all interested in Education.

The establishment of ARCADIA on Unique Lines as a GREAT NATURE-STUDY INSTITUTION.

(Through the aid of a philanthropist whose name is withheld by request.)

Arcadia is to be a "village" of portable buildings devoted to various phases of natural science. The buildings are to be arranged in the form of a court covering more than a half-acre of ground. There is to be an astronomical observatory, "Home" of The Agassiz Association, biological laboratories, vivaria, aquaria, clearing house (for circulating specimens), pet houses, insectary, photograph gallery, experimental rooms, offices, lecture hall, etc. Within the court made by the surrounding buildings is to be a garden with plant beds for experimental purposes, in brief, it is to be an epitome of the essential features of zoological park, biological laboratories and experimental horticultural grounds.

If the experiment proves a success upon two years' trial, it is promised that the entire equipment will be rebuilt in larger fireproof buildings (with more extended equipments for study and experiment.) The tests of success are to be the cooperation and interest of naturalists of all ages in all parts of the world. Full particulars in the January number of *The Guide to Nature*, Stamford, Connecticut. Single number, 15c. Subscription for one year, $1.50. Edward F. Bigelow, Director of Arcadia, Stamford, Connecticut.

EDITOR'S NOTE: SUGGESTIONS WANTED

With this number THE NATURE-STUDY REVIEW begins its fifth year, and the second as the official journal of the American Nature-Study Society. A glance back over the indexes of the past four years shows that, true to its sub-title, THE REVIEW has been "a journal devoted to all phases of nature-study in schools." It is certainly difficult to think of many topics connected with any school studies of nature which have not been touched upon in articles published in this journal. All this which is very gratifying to the editor is also perplexing. Is it advisable to keep to the lines laid in the past four years? Is there too much discussion of science and nature-study problems? Should there be more attention to the subject-matter which deserves to be taught; and if so, how should it be done? Will more notes and reviews be welcomed? Has any reader missed the "Guide to Periodic Literature on Nature-Study" which was contributed to Volume I and then discontinued?

These are some of the questions which the editor must decide. The evident truth is that THE REVIEW has not yet struck a popular note, else it would be indispensable to at least 10,000 readers. Is the failure to reach such a large group of readers the fault of THE REVIEW in its editorial policies, or is it due to limited interest in the field which the magazine represents? If desirable, editorial policies can be adjusted; but how stimulate interest in the field of general nature-study and elementary science?

The above questions suggest some of the greatest problems which the A. N. S. S. must face, and they are printed with the hope that various members of the Society will make suggestions or at least help indirectly by pointing out mistakes made in the past. The editor will gladly get an abundance of advice and criticisms, especially the constructive form of the latter.

THE
NATURE-STUDY REVIEW
DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

VOL. 5 FEBRUARY, 1909 NO. 2

INDIANA NUMBER

This number has been prepared under the editorial direction of Professor Stanley Coulter, of Purdue University, Lafayette, Indiana.—Managing Editor.

NATURE-STUDY IN INDIANA

By STANLEY COULTER
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Work in nature-study has been carried on in Indiana since 1895. At first merely in scattered centers and in extremely desultory and illy organized fashion. Later, chiefly through the influence of the leaflets upon nature-study issued by Purdue University, the number of schools presenting the subject was very greatly increased. These leaflets, twenty-five in number, also served to give definiteness and purpose to the work, and at least indicated possible pedagogical values. While these leaflets were open to criticism from many view points, their influence upon nature-study work in Indiana has been very great and has proved permanent.

Somewhat later still, courses in nature-study, under the direction of the writer, were offered by the Winona Summer School and Assembly and were very largely attended. These courses were based upon the belief that, if nature-study had any place in the schools, it had that place because it contributed in a very definite and clearly cut way to the symmetrical intellectual development of the child. Out of this belief grew the notion that nature-study was not a body of knowledge and that, therefore, the material was to be regarded as incidental, the intellectual development or mental attitude constituting the real center of the work. The contribution of nature-study to the intellectual symmetry of the child was assumed to be the development of the *perceptive* powers. In spite of various vigorous criticisms of this view, the writer still holds firmly to the opinion that this

conception of the function is sufficiently definite to give pedagogical value to the work and is at the same time sufficiently comprehensive to include the definitions of the leaders of the nature-study movement.

During this period Professor C. F. Hodge came to Indiana and developed the subject in many counties at teachers institutes and also, under the auspices of the Summer Biological Station of Indiana University at Winona Lake, gave extended series of lectures to the large number of students and teachers there assembled. The enthusiasm and personal magnetism of Professor Hodge are so well known, as are also his views upon the content, presentation, and significance of nature-study, that no extended comment is necessary either as to the character or extent of his influence upon the movement in this State.

Later under the forward movement in agricultural education, the nature-study movement especially in the rural schools and to a very considerable extent in urban communities as well, was given a very definite direction and took on a new vigor because of the close relationship existing between the work and the daily life of the child.

Much other notable work in nature-study was done in the State in these earlier years, but the above represents the organized and continuous efforts to give direction and value to the movement. These may be taken as the main factors influencing the content and form of nature-study work in Indiana, and in almost every school in the State the dominance of some one or the other of these influences may be recognized.

The first peril through which the movement passed, if it has even yet escaped the danger, was that of formal courses of study embracing in the work of each year almost every known group of objects and phenomena. Courses which were invariably too extensive and in far too many instances extremely illogical and poorly adapted to the needs or capacity of the pupils. Almost every city gave in its manual extensive outlines of work in nature-study, outlines manifestly impossible to be carried out either by the teacher or the pupils. The almost immediate result of this phase in the development of the subject, was loss of vitality, a consequent loss of interest and in some instances the complete disappearance of nature-study from the schedules. So serious were the results that a leaflet was issued calling attention

to the real pedagogical significance of nature-study and urging a revision of existing courses in the light of this conception. As a part of this leaflet a tentative outline of work (*) was suggested as, at least, workable. This marked the beginning of a departure from extended, formal courses and a substitution of a series of suggestive courses, a line of action which received immediate justification in the results.

At present there is a decided tendency to depart from the term nature-study altogether and to substitute some other, which has not had such a load of educational absurdities to slough off. In the last State Manual and Uniform Course of Study for the Elementary Schools of Indiana, issued by the Department of Public Instruction, "Nature-Study" disappears and "Agriculture" is substituted. An examination of the outline shows that the change merely serves to make the work a trifle more informational and didactic and to restrict the material to fairly rigid boundaries. In many cities also the title has disappeared, the work, in part at least, appearing under the high-sounding phrase "Vocational Training." In this case also there seems to be some indication of a modification of the work in such a way as to cause it to lose its real significance. With terminology we have no concern, if the real heart of the matter be reached; and the indications at present are that the value of nature material as an educational tool has been so thoroughly demonstrated in Indiana that its use will never be abandoned, under whatever name it may be compelled to mask itself.

The trend in nature-study work in Indiana is in the right direction. It is losing its formal taint and its rigidity; it is becoming more and more vital and educational, in that it rarely today attempts to cover the whole range of the universe; the initiative of the teacher is showing more and more, and the material employed is more often than formerly related to the environment instead of to a text-book. It is a safe assertion that more real nature-study work and better nature-study work is now being done in the State than ever before and that this condition very often exists in schools where nature-study has no definite place in the courses of study.

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*What Experience Has Taught Concerning Nature-Study. Stanley Coulter, Purdue University, Bulletin.

THE CHARACTER AND PURPOSE OF WORK IN ELEMENTARY AGRICULTURE IN INDIANA

By M. L. FISHER
Assistant Professor of Agronomy, Purdue University

Although the Indiana State Board of Education has issued a course of study in agriculture that proceeds along systematic lines, yet the work is in the main unsystematic and desultory. This is due, not so much to an ill-defined notion of what should be done, as to lack of facilities and properly trained teachers. The purpose of the work is best expressed by the following quotation from State Superintendent Cotton's discussion of Agriculture and Domestic Science in the 1908–09 State Manual:

"The purpose is in the end educational and not merely to give the pupil information or manual skill or entertainment. The real end to be sought is to enlarge his intellectual field, to give him right ideas about work and industry and to correlate his school work with home life and environment." This view is shared by all who have a comprehensive grasp of the situation.

In most cases, the points of beginning have been along lines in which pupils are most interested. Indiana is a large corn producing state. In almost every community the dominant interest is the growing of corn. This led those who were early in the work to organize clubs for the study of how to produce more and better corn. In many cases these clubs included both boys and girls. The county superintendent was usually, although not always, the leader in the organizing work. Pupils were furnished a definite amount of seed and given directions for planting, cultivating and harvesting the crop. At a set time all came together for a competitive exhibit. The corn was judged according to a score card, prizes awarded, and a talk given on corn growing. These corn clubs also stimulated interest in corn growing among the parents of the pupils. More books and bulletins on corn growing were read than ever before and so the way was opened. Teachers have found it easy to take up the study of corn in a systematic way in the schoolroom and the interest is easily led along other lines of agricultural endeavor.

In other schools the work has been started by a study of how plants grow. A study of the germination of the seed, the needs

of the young plant, and its development into the mature form are of great interest. Starting in this way, it has been possible to carry the work along more systematic lines than when beginning with the study of a particular crop. However, both methods are leading to practically the same end and are giving results which are truly educational.

An inquiry by the writer as to what topics are best suited to schoolroom presentation shows that practically all agree that facts and demonstrations relating to seed germination, plant culture, and soil management are most popular and most effectively presented. Some schools have taken up work in grafting and fruit production, and others have worked with live stock. In nearly all schools nature-study has had a place and the facts of nature have been used to explain many of the common occurrences on the farm. The study of insects, birds, and weeds are the most popular phases of nature-study. In all cases it is the purpose of the teacher to make the work in agriculture practical, and many little experiments to demonstrate its practicability are carried out in the schoolroom.

The gradation of the work is lacking somewhat in uniformity. Reports from county superintendents show that in 45 per cent of the counties giving instruction in agriculture, it is given to all grades below the high school and in many of these the work is also given in the high school. In all, 25 per cent of the counties report instruction given in the high-school grades. Many counties give instruction only in the upper grades, while a few confine it to the primary grades where it must of necessity be more nature-study than agriculture.

In many high schools the work is correlated with botany to the advantage of this subject. Correlation has been found to be a very practicable method of presenting agriculture in most schools, due to a crowded schedule and a heavy curriculum. Some teachers present the work in lecture form before the entire body of pupils, but in most cases it is presented to the separate classes according to their capabilities. When the schedule is over-crowded, many teachers have found time for agriculture by alternating it with other subjects, as, for instance, reading and geography. Geography, by the way, is an excellent subject with which to correlate, especially the soil study. As a rule, recitations in agriculture are not held oftener than twice a week.

The use of a text-book in the hands of pupils in grades below the high school is not common. In many cases, a text-book is in the hands of the teacher and lessons are presented in the form of a familiar talk, often illustrated by simple experiments or easily obtained illustrative material. Many schools also have books on agriculture in the school library. Pupils are encouraged to read these and look up assigned topics. About 50 per cent of the counties use one or more of the various elementary texts now common on the market. In several instances the work is conducted from outlines issued by the county superintendent. These usually aim to awaken interest in things of local importance and then lead to things of wider consequence.

The enthusiasm with which instruction in agriculture and related nature-study is received by pupils and patrons is most encouraging. In reply to the question: Is the work successful? 75 per cent of those answering the question reply decidedly in the affirmative, while but one county reports the work a failure and that due to the overcrowded curriculum. Replying to the question: Do patrons wish instruction in Agriculture given to their children?, no negative replies were received and in only one case was it reported that patrons had little interest in the matter. A few extracts from replies may be of interest in showing the attitude of patrons: "The work has been successful and patrons are pleased with it." "The teaching of these subjects has been successful and patrons want them taught in the schools." "The work is successful. Patrons are not enthusiastic at first but soon become so." "Parents invariably approve." "The teachers report the work very successful. My observations have made me think so. Talks with the boys and parents say so." "The work is successful. The pupils, even the young ladies, enjoy it. Patrons are highly pleased with it."

The writer has talked with many teachers who have tried teaching the subject, and he has not met a single one who considers the work a failure and impracticable.

THE EXTENT OF INSTRUCTION IN ELEMENTARY AGRICULTURE IN INDIANA

By M. L. FISHER
Assistant Professor of Agronomy, Purdue University

In less than ten years the subject of agriculture as a part of the public school curriculum has risen from being an unheard of subject to one discussed at almost every meeting of educators. Without any compulsory statute this subject is rapidly taking its place as a part of the regular course of study in Indiana schools.

Reports from county superintendents of instruction indicate that approximately 3,000 schools, or 30 per cent, teach agriculture in a greater or less degree. Indiana has 92 counties. Of these about one-sixth, or 16–⅔ per cent, report no work at all along the line of elementary agriculture; 7 per cent report that all the schools in their counties give such instructions; 20 per cent show that 75 per cent and more of their schools are giving such instruction to their pupils; 16–⅔ per cent have between 50 and 75 per cent of their schools doing such work; 20 per cent have work in from 25 to 50 per cent of their schools; while another 20 per cent of the counties report that less than 25 per cent of their schools give attention to agriculture. The writer believes that it is safe to assert that there is not a county in Indiana but what in some one or more of its schools the teacher is calling attention to and giving some instruction in the elements of agriculture.

Of the commissioned and non-commissioned high schools about 10 per cent, or 70 in number, are reported as offering work in Agriculture. The indications are that this number will be doubled in the school year now at hand. Many superintendents eport that all of the non-commissioned high schools in their-rounty give such instruction. Since the State Board of Educaction has made Agriculture equivalent to Latin, it may be con fidently expected that the number of schools giving agriculture will greatly increase.

There have heen about five factors which have contributed to this growth of interest in agriculture as a public school subject:

1. Teachers' Institutes. Many wide-awake county superintendents who realized the necessity for such instruction in the schools have provided lectures on agriculture and related

nature-study for the teachers in the annual County Institute. About 30 per cent report that such instruction has been given.

2. College extension work. The extension work of the Experiment Station and Agricultural College has had much to do with moulding public sentiment in favor of agricultural education. Corn, soil, fruit, and dairy trains run over the different lines of railway in the State have shown people that agriculture is a teachable subject and about which there are many simple and useful facts not commonly known.

3. Boys' and Girls' Clubs. The organization of the school boys and girls into clubs for the raising of farm products for competitive exhibition has stimulated the boys and girls themselves to want to know more about agriculture. Fully 50 per cent of the counties have such clubs. In most counties the organization takes the form of a club for the raising of corn; but in many wheat, oats, potatoes, poultry, bread, and butter are produced as well as corn.

4. Farmers' Institutes. More powerful than any of the preceding has been the influence of the farmers' institutes. The superintendent of farmers' institutes, Professor W. C. Latta, has for many years realized the advisability of giving this subject a place in the list of topics discussed at farmers meetings. The annual meeting of county chairmen and state speakers has had this topic in one form or another before it for several years and various resolutions have been passed showing the attitude of these leaders on the subject. In the institute season of 1906–07 practically every one of the main institutes discussed agricultural education, and many of the supplementary institutes also had the subject on their programs.

5. Popular Demand. Perhaps more potent than any other has been the influence of public opinion. It would be rather difficult to say whether public opinion is the result of the working of the factors already mentioned, or whether they are the outcome of the public demand. It seems to the writer that with the exception of No. 4, the latter case is true. Farmers read of the progress made in other lines of industry by reason of special training and they desire the same thing for themselves. If manual training and instruction in the arts is good for the city boy, a similar training in things rural is equally good for the country boy. In reply to the question: Do patrons want instruction in agriculture given? superintendents have almost invariably answered in the affirmative.

NATURE WORK IN EAST CHICAGO, IND.

By E. N. CANINE
Superintendent of Schools

If nature-study is taught in a perfunctory manner, merely because it is a part of the course, it might much better be omitted entirely. Any one can walk out into the fields and see the trees and flowers and hear the birds. Few will know or fully appreciate them. If we expect to get insight into nature we must look beneath the surface and see the inner workings. To train children to find out for themselves, and to appreciate the facts of nature is the business of the school. This is a scientific age. Almost every phase of life is conditioned and hemmed in by natural phenomena, and applied science. The school can not neglect to acquaint the child with these conditions, and to give him power to interpret them. With this spirit the course is planned. The central idea about which the present lessons are planned is the general influence of the seasons. Let us come into close touch with these phenomena. Observe and study the real object; do not merely talk about it. More work is planned than can be done successfully in any one room. This is to give teachers some choice of subjects. Put the work into the other lessons just as much as possible, but give nature-study its legitimate share of time. Plan the lessons for this subject just as carefully as for any other subject. Pay special attention to the topics that deal with health, as cleanliness; warm, dry clothing; and ventilation. Let teachers put forth every effort to secure higher standards of living for the children. These lessons are based very largely on the outlines of Hodge and McMurry.

List of Reference Books

Not all of these books are found in any one building, but teachers should know just what is at hand, and when material can not be found to carry on the work report to the principal, who will immediately report to this office:

Hodge—*Nature-Study and Life.* Gray—*How Plants Grow.* Coulter—*Plant Relations.* Bergen—*Foundations of Botany.* Keeler—*Our Native Trees.* Needham—*Elementary Lessons in Zoology.* Torrey—*Everyday Birds.* Miller—*First Book of Birds.* Holland—*The Butterfly Book.* Bulletins—Agricultural Department. Hurty—*Health Lessons.* Lange—

How to Know 100 Wild Birds of Indiana. Jewett—*Good Health.* McMurry—*Special Method in Elementary Science.* McMurry—*Science Lessons for Primary Grades.* Harrington—*Physics for Grammar Schools.* Cooley—*Easy Experiments in Physical Science.* Blanchan—*Bird Neighbors.* Dana—*How to Know the Wild Flowers.* Weed—*Life Histories of American Insects.* Flower—*The Horse.*

[As an indication of the nature of the work, the following outline for the first year is added to this statement. EDITOR.]

FIRST YEAR.

FALL MONTHS

I. ANIMAL LIFE:
   1. Birds.—Robin, blackbird, and others: Report every day they are seen; haunts, habits, food. What other birds are here now? Coming of fall and winter birds.
   2. Domestic and wild animals: Life histories of the dog, cat, and squirrel.
   3. Insects—Milkweed butterfly, moths, caterpillar, grasshopper, cricket. Place in glass jar with a little soil; feed with grass, apple, beet, etc., each day. Watch for eggs. How is chirp of cricket made?

II. PLANT LIFE:
   1. Flowers:
      (a) Names of common fall flowers; leading characteristics: press and mount, with data.
      (b) Golden-rod, aster, milkweed, poison ivy.
      (c) Nasturtium, Lima bean. Save seeds.
      (d) Flower calendar.
   2. Vegetables: Recognize and name fall vegetables. Model in clay.
   3. Trees—Soft maple, chestnut: Recognize by fruit and leaves. Save and plant seeds. Collect autumn leaves and nuts.
   4. Fruits: Peach.

III. WEATHER CHARTS:
   Bright days, yellow circle.
   Cloudy days, gray circle; or half of each, if necessary.
   Weekly, monthly, and yearly summaries.

IV. PHYSIOLOGY AND TEMPERANCE:
   Lessons on cleanliness, food, good habits. See beginning chapters of Introductory Physiology and Hygiene—Conn. Frequent breathing and calisthenic exercises.

V. Use stories, poems, and pictures bearing on these lessons.

WINTER MONTHS.

I. ANIMAL LIFE:
   Birds: Color, food. Where do they stay and how do they keep warm? Look out for winter birds. Watch for return of spring birds in latter part of term.

2. Domestic and wild animals—Horse and cow: Clothing and shelter, winter food. Do they drink much? Fishes: Do they get air under ice? Do they get cold? Food. Goldfish: Movements, eating, breathing.

II. Plant Life:

1. Study of buds.
2. Effects of cold weather on trees and grasses.
3. Latter part of term watch for pussy willow and maple blossoms.
4. Prepare seeds and boxes for spring planting.

III. Continue weather study. Lengthening days. Need of fuel. Work of frost—window painting, breaking of pitchers and water pipes. Snow as a protection.

IV. Continue work of fall term. Special attention to warm and dry clothing of children. Compare to animals.

V. Continue from fall term.

Spring Months.

I. Animal Life:

1. Birds: Watch carefully for return of birds. Find out names beforehand, if possible. Keep record of date of appearance. Notice coloration, food and nesting habits, chirps and songs. Hold to actual observation. Detailed study of robin and some other bird.
2. Study of moths and butterflies as they develop from cocoons gathered in fall.

II. Plant Life:

1. Continue the study of buds of any fruit trees, especially of peach or apple, if they can be had. Notice leaf buds and what trees are in leaf first. Identify by leaves. Gather seeds, plant in garden, and watch their growth.
2. Flowers: Study violet, and spring beauty if it can be found. Watch for others. Press and mount, giving data. Flower calendar.
3. Seed germination: Plant in window boxes seeds of Lima bean and Nasturtium. There are many devices for germination of seeds. Use whatever will enable close observation on the part of the pupils.
4. Encourage home gardening and care of the lawn. The gardens here have to be made. If all the children can be interested in this we can soon have a much better appearing city. Visit and direct their work when practicable. A school garden would be valuable, but the individual gardens and lawns would be of more worth. Encourage the children to care for gardens through summer and have fruits, flowers, or vegetables for fall study and use.

III, IV, V. May be continued, but put emphasis on above topics. Central thought—awakening and growth.

NATURE-STUDY IN THE ELKHART SCHOOLS

By E. H. DRAKE,
Superintendent of Schools

"Nature-study is learning those things in nature that are best worth knowing to the end of doing those things that make life most worth the living."—Hodge.

It is during the years that the child is in the public school that aptitudes are developed, tastes acquired and life habits formed. Hence, during these important years, every child should be taught to know and love nature, should be led to form habits of observation that will enable him to understand something of the great laws which will go far toward making his life work more profitable and delightful.

Nature-study is not science. It is not a collection of facts written by some expert. It is concerned with the child's outlook on the world. It is coming into personal relation and sympathy with the outside world. It is the knowing of plants, insects, birds, trees, etc. It is the seeing of things first hand.

Nature love tends toward naturalness and toward simplicity of living. It tends "country ward". One word from the field is worth two from the city. "God made the country." The child can comprehend nature and will be interested in it because he finds much which is so intimately connected with his own life.

Nature-study has its disciplinary value upon the child's mind. It develops those centers of mind that otherwise might remain dormant. He will acquire a fund of knowledge of the things about him which will do much to increase his interest in the outside world.

The child should be led to see the unity, harmony and beauty of nature. This will help him to appreciate more fully his relation and dependence upon the plant and animal life in his vicinity.

One need only look at the ruthless destruction of our birds and the rapid spread of insect pests, to realize that the time is at hand for something to be done. The common school is the place to begin this fight "for the good and against the bad" in nature. Very few people know even the names of the insects injurious to their fruit trees, shade trees and common garden vegetables. They know very little, or nothing, of the bothersome weeds and

spores of the parasite fungi which cost the agriculturist millions of dollars annually. The rapid development and spread of obnoxious weeds and injurious insects is due principally to the wanton destruction of the birds. The surest way to promote this sentiment of bird protection is to teach our pupils to study and know the birds. Every person who becomes intimately acquainted with them learns to love and respect them for their incalculable benefits to mankind. We must educate the child for the life of the next generation. This can be done if the teacher is alive to her work and interested in nature herself. Much depends upon the spirit and aptitude of the teacher. Interest in anything is contagious; from the teacher it is sure to find its way to the pupil and from the pupil it will be carried into the home. The pupil should receive his inspiration from the teacher who herself is so full of the subject that she teaches with spirit and cheerfulness. "The power that moves the world is the power of the teacher."

It is not necessary for the teacher to be a scientist, but she should be informed. Helpful books on nature-study may be gotten almost without number. One of the best books to be in the hands of the teacher is Hodge's "Nature Study and Life." The outline of the first five years' study is based largely upon this work. The work as outlined is divided into six periods of six weeks each, which are as follows: (1) Late summer and early fall period; (2) Late fall or frost period; (3) Early winter or beginning of freezing period; (4) Winter or the hard freezing period; (5) The thawing period; (6) The spring period.

As the work is outlined, it is the purpose to give most attention to trees, birds, insects, and a few familiar wild flowers, of the vicinity of Elkhart. Hence all the material used is to be found in this locality. The collecting of materials and the field observations must of necessity be done in the fall and spring terms. However, the teacher can collect and preserve much material which may be used during the winter months. The teacher should lead the pupils to see the relation existing between plants and insects and the relation of birds to both. A vast amount of material will be brought into the schoolroom and many questions asked. This should be encouraged and directed by the teacher. Due attention should be given to all animal and plant life, not outlined in the course, when it is secured and presented by pupils.

Along with the nature work a course has been planned in physiology and hygiene. This work should emphasize health and disease; how to preserve the former and prevent the latter Teachers should in all grades emphasize the great importance of such things as cleanliness (of person, premises, community), bathing (uses of hot and cold baths), pure water (diseases arising from that which is impure), pure food, pure air, (open windows in the sleeping room), means of transmitting disease, protection against common and contagious diseases, bacteria. Study health regulations, sanitary laws, reports of Board of Health. Teachers should study and teach much of Chapter XVII of Hodge's book.

THE MAKING OF SCHOOL-GARDENS AT DELPHI, INDIANA

By E. L. HENDRICKS
Superintendent of Schools

A garden should be connected with every school.—Comenius.

What is a school-garden and of what value may it be to a community? Is it only a fad introduced by over-zealous educators, or have time and experience justified its existence?

It must be admitted that school-gardens are almost unknown in the United States as a whole. A few cities have experimented with them, but they are noted chiefly for their absence in our system of education. In Europe, however, their value was recognized long before the public school system was organized. Two hundred and fifty years ago, Comenius, the greatest of educators, said: "A garden should be connected with every school." His native country now requires by law a garden in connection with every school. Eighteen years ago France declared that no plan of a school-building would be accepted without provisions for a garden. Today she has thirty thousand school-gardens. The little country of Bohemia has nearly five thousand school-gardens and her enormous fruit crops are ascribed to school instruction. Sweden has required school-gardens during the past thirty-five years and prizes them more than her system of manual training. No, the idea is not new. It has been a feature of European schools for many years. It is no longer and experiment. Its value is evident; its success assured.

The school-gardens at Delphi were begun in a conservative manner. The superintendent has not permitted the new interest

to absorb attention from the time-established studies of the school. The common school branches still form a heptarchy of which reading is the traditional queen. It occurred to him, however, that here was an opportunity to work out a problem of interest and of possible value; that there it might be possible to awaken a wholesome interest in that which is a source of life, health, beauty, and happiness.

The subject was first discussed with the school-board. In this discussion it was noted that modern life tends to drift away from nature into artificialities, that education teaches our children to work with their brains, but not with their hands. Although Delphi is a rural community, it was observed that we taught our pupils nothing of the soil, of the growth of crops which makes farm life possible, nor of the growth of trees, shrubs, and flowers, which make the farm home beautiful. Each member of the board had witnessed the exodus of our young men to the cities, and it was decided that an effort to retain the succeeding generation was laudable. One member of the school-board is a native of Germany, and his observation of school-gardens in his fatherland proved of value in securing consent to try the experiment.

The subject was next presented to the teachers. The superintendent reported on his visit to the school-gardens of Boston, on the experiments of Dr. Dewey, of Chicago, and on minor experiments in Indiana. In this discussion the value of manual training in its different phases was presented. It was pointed out that while the use of tools was valuable, it can never equal, even as a household art, the garden in economic value. It was said that the very use of tools was suggestive of the city work shop and factory. It was agreed that education should place the country child into direct relation with the objects and events with which he lives. Instead of teaching banking and brokerage, stocks and bonds, and foreign exchange, it was thought wise to spend some time on those things in nature best worth knowing and which aid the pupil in rural living. Likewise it was urged that if science could thus be changed from a dead museum affair into a study of nature as it affects community life the experiment would be worth while.

The city council was informed of the plans and purposes of the school-board and teachers. The result was a donation of land within the city limits for the gardens.

This land was formerly a city cemetery. It contains nearly four acres. The greater part of it is upland, but the west half slopes and the southwest corner dips into the old Deer creek basin. It is an ideal location, convenient to the school, and well adapted to its purpose. Dr. O. W. Caldwell, on his return from a visit to some of the one hundred thousand school-gardens in Europe, said: "I know of no other city with a like opportunity."

The condition of the abandoned cemetery need not be described. To render it sightly one hundred dollars was given by the school-board and a similar donation was secured from the city council. To the superintendent fell the task of landscape gardening. The upland was freed from rocks and shrubbery, plowed and leveled. Driveways were constructed of a heavy layer of lime, secured from an abandoned limekiln near by, and covered with twelve inches of cinders from a paper mill near at hand. The essentials of a city park were kept in mind and the features of park and garden were combined. The two hundred dollars proved sufficient to prepare the ground for planting the following spring.

In the warm days of spring the ground was plowed, pulverized, and marked with deep furrows six feet apart. Each child was thus given a garden six feet square. In the schoolroom he was directed by his teacher how to use garden implements (brought from home) and how and what to plant. He was allowed much freedom in the choice of seeds, and he knew that the vegetables raised should be his own. The pupils of all grades prepared and planted their gardens at the same time. The furrows about the beds were converted into paths and the beds were further pulverized with hoes and rakes. The effect of four hundred pupils working with earnestness and enthusiasm in their gardens at the same time was beautiful and inspiring. The remainder of this article could well be devoted to the manner of planting and cultivating these gardens. Another might be written to show the lessons in practical living derived from the gardens. For example, the public school-gardens led to the planting of twenty-five gardens in homes of the city where gardens had not been planted before. Parents encouraged their children to plant at home and a small prize was given from the returns of the school-garden to the pupil having the best home garden. The work of pupils was correlated with language study and expression.

We have found one obstacle which is serious and which we are unable to overcome. We planted as early as the season would allow, and only those vegetables which mature early, yet the plants had not matured when school closed. Only a few pupils live near enough to care for their gardens during vacation and the supervision of the teacher is wanting. We attempted to solve this problem the following year by planting only those vegetables or grains which mature after school opens again in the autumn. We were partially successful. But in order to accomplish this it was necessary to take a step in advance of that intended. We planted corn and tomatoes collectively and cared for each by rooms. A small field of late beans and another of cabbages were planted by rooms. The janitor cultivated the crops during vacation, after which they were harvested by the pupils and taken to a canning factory. The successive steps in these processes were noted and reported by pupils. The proceeds of their co-operative labor adorned their several rooms.

The commercial value of the gardens has not been emphasized, yet its value is apparent. The ground in cultivation measures a half acre and brought returns during the past year as follows:

Tomatoes	$ 5.85
Premiums on tomatoes	.50
Corn	12.79
Fodder	1.00
Cabbage	8.25
Cucumbers	10.00
Total	$38.39

Cucumbers proved the most profitable crop of the season, one-twentieth of an acre bringing a return of ten dollars.

A small exhibit was made at the Delphi street fair and first premium taken on tomatoes. Our boys declared that we should have received first premium on cabbage also if we had not been "jockeyed."

In the vegetable gardens it has been possible to notice the character of soil in preparation for planting; to observe the importance of selecting good seed; the necessity of pollination, etc. The fodder from the corn field was sold and the effect on the soil of thus removing the entire crop was discussed. In other and smaller beds nitrogen collecting plants were removed from one bed and turned under in another to show the exhaustion of

soil. Insects beneficial and harmful to a garden were studied, and it is safe to say that the homely toad has no better friends than among the school boys of Delphi. But with all the benefit thus secured the true value of school-gardens will not be known until teachers supervise their cultivation during the growing season.

On the east side of the grounds was planted a fruit orchard. Three dozen trees are now growing nicely. Here it will be possible to give practical lessons in fruit growing. Already have the boys learned the evil designs of the coddling moths on apples and of the aphids on cherries; the woodpecker is a gallant knight to the rescue.

Beside the orchard the pupils have begun a forest by planting nuts of trees common to the community. There may be thus started a miniature experiment station in forestry for the country.

Perhaps the most beautiful section of the garden is the steep but well-sodded hillside. This has already received the returns of many excursions by high-school students. It contains many species of wild flowers and shrubs and the purpose is to place within it all species common to its botanical belt. It is being planted after the manner of nature with the wildness of nature intensified. Its value to nature-study in the grades and to botany in high school maylprove incalculabe.

Some attention has been given to the care of cultivated flowers. Citizens have been generous in sharing plants and shrubs of their homes. Odd nooks and corners have been utilized for a display of summer bloom lasting into autumn. Old fences have been decorated with vines. On either side of the drives, and in the triangular spaces between, foliage plants and flowers are grown. A civic pride is thus awakened, for Flora keeps watch with Ceres and Pomona over the garden. And in the soil lore of this garden there is a real magic to which the human myth and fairy tale appear only as lingering shadows.

What the future of the gardens will be depends upon the attitude which superintendents will take toward them. The community is willing to support their rational development. Our country is not old enough, nor our population dense enough to demand the attention given to school-gardens in Germany. But there can be no doubt of their value as a means of information on various lines of human knowledge. Nor can there be any

question of the value of an admixture of earth, growing plants, fresh air, blue sky, and warm sunshine to growing boys and girls. The human race, like Antaeus, renews its vigor every time it touches Mother Earth.

CORN CONTESTS AND AGRICULTURAL WORK

By G. M. WILSON
Superintendent of Schools, Danville, Ind.

I became convinced some years ago that there existed a prejudice against the farm among common-school and high-school graduates. After considerable study and research and some experimenting, I decided that agriculture in our schools would overcome this prejudice and would also do for our country boys what manual training is doing for our city boys.

The work being done in other States and other countries was especially encouraging to me. The elements of agriculture and domestic science are being taught throughout the length and breadth of Italy in rural schools. The people heartily support the movement. Thousands of small tracts of land (valued at over 1,000,000 lire) have been donated as school-gardens and experimental fields. The present minister of education says: "Agriculture now succeeds where manual training failed, because the people are interested." The course in agriculture is further adapted to local needs. Silk culture is emphasized in one district, stock raising in another; the vineyard in one part, the olive and orange trees in another.

In France, Germany, in Scandinavia, agriculture is thoroughly established, the people's high schools of Norway being a special feature in that country. Even old Spain is waking up and is now planning for half a dozen agricultural colleges, after the American pattern, these to form the apex of a system that shall reach downward and outward to the district schools.

To come nearer home, what is being done in our country? I had long known of the Hampton and Tuskegee schools. I was a little surprised to find agriculture established in the district schools of Illinois, Minnesota, Wisconsin, and Tennessee, and in the high schools of Vermont and Alabama. I was pleased to find the movement encouraged by such able men as Dean Russell of Teachers College, Columbia University, and the late President Harper of Chicago University.

Most educators now agree with the 1905 National Educational Association report on Industrial Education—"that the mastery of such parts of this rapidly developing body of industrial knowledge as is within the capabilities of elementary and secondary school pupils, furnishes a mental training *unsurpassed in extent and quality* by the mastery of any other body of knowledge now regarded as essential in our common school courses and requiring an equal amount of time; and that *for utility value* it is not equalled by any other body of knowledge at present acquired through the expenditure of the same amount of time and effort."

Agriculture is a regular part of the Indiana high-school course of study since the last legislature passed a law to that effect. The corn shows and Purdue University excursions of the last three years in this country have at least put all of us in a favorable attitude toward this work, and have emphasized the common interests of the farmers and the schools.

The following tells its own story of effort:

Hendricks County Public Schools, Corn Contest, 1907

CORN GROWING AND SELECTION CONTEST.

1. This contest is open to any school pupil in the county (common school or high school pupil) who is regularly enrolled and doing creditable work. Each pupil entering must present a statement from his teacher certifying that the above conditions are fully complied with.

2. All corn must be grown upon land owned or leased by the pupil's father. No land must be leased especially for this purpose.

3. Enough pure seed corn will be furnished each pupil (or the pupils of one family) to plant one acre of corn. But if pupils prefer they may procure their own seed. Application for seed should reach the county superintendent by April 1.

4. Where there are two or more pupils in one family, who enter this contest, they may plant just one acre and work together in growing the corn.

5. Each pupil who receives seed for this contest must exhibit twenty ears in the corn show at Danville, December 7, 1907.

6. The corn exhibited at the corn show will become the property of the Trustees' Association, and may be sold at auction or otherwise used in the interests of corn work in the county.

7. Boys who enter this contest will be expected to do their own work of growing an acre of corn. Girls will only be required to supervise the growing of the corn. Neither boys nor girls will be allowed to receive help in selecting the twenty ears for the corn show.

8. All entering this contest must make a special study of the corn plant, and submit a record of how the corn was grown.

9. The contest will be decided according to the following conditions, making 100 points in all: 40 points on yield, standard being 80 bushels or more per acre; 50 points for the score of the twenty ears entered in the corn show; 10 points on record of how grown.

10. In each township the township trustee and the vice-president of the farmers' institute will act as a committee to determine the yield, 70 lbs. being considered as a bushel.

11. All entries in the corn show should be in Wilhite's jewelry store or the county superintendent's office by December 2, but entries will be received up to 6:00 p. m., December 6, 1907.

12. The prizes are as follows: 1st prize, $20.00 cash; 2d prize, $10.00 cash; 3d prize, $5.00 cash or equivalent; 4th prize, $3.50 cash or equivalent; 5 th prize, $2.00 cash or equivalent; next ten prizes, $1.00 each, cash or equivalent.

Remarks: If it becomes necessary to limit the number of entries, an effort will be made to equalize the number in each township. Teachers having pupils desiring to enter, should send in the names and addresses at once, so that arrangements may be made for enough seed corn.

The acre selected for growing the corn should be clover sod, separated by several rods from any other corn. The soil should be fertile and well drained. A moderately heavy coat of barnyard manure should be spread over the ground and disced in before the ground is broken. After the ground has been broken it should be disced and cross-disced and harrowed until the soil is thoroughly pulverized. A thin coat of barn-yard manure may be applied after breaking and before discing. If a commercial fertilizer is used it should be drilled in with a large wheat drill just before planting. After planting, the ground should be regularly cultivated each week and after every rain even if there are no weeds. Cultivation should be shallow and may continue with profit even into August.

As soon as the tassels appear they should be removed from all barren, weak and smutted stalks. Your seed for next year should be selected between October 10 and October 15, and should be preserved according to Circular No. 2 from Purdue.

References: (Free for the asking as long as the supply lasts.)

1. Farmers' Bulletin No. 199, Washington, D. C.
2. Farmers' Bulletin No. 272, Washington, D. C.
3. Farmers' Bulletin No. 81, Washington, D. C.
4. Bulletin, No. 110, Purdue University.
5. Bulletin No. 82, University of Illinois, Urbana, Ill.
6. Bulletin No. 77 (April, 1904), Iowa Agricultural College, Ames, Ia.
7. The Kansas Corn Book, State Board of Agriculture, Topeka, Kansas.

Corn Scoring Contest.

1. Open to common school pupils (below the high school) who are regularly enrolled and doing creditable work, as shown by the teacher's certificate.
2. Prizes will be announced later.

3. The following questions must be answered by competitors in the corn scoring contest and will count ten points.

(1.) When should seed corn be gathered and how?
(2.) How should it be kept through the winter?
(3.) How should seed be tested before planting?
(4.) What is the purpose of cultivation when corn is not weedy?
(5.) Should cultivation be deep or shallow? Why?
(6.) What per cent. of the food value of corn is in the ear? In the fodder?
(7). What feeds go well with corn to make a balanced ration in feeding hogs or cattle?
(8.) How should corn land be handled to maintain its fertility?
(9.) Explain the corn breeding plot, why certain rows are detasselled, and the seed used in detasselled rows.
(10.) Is your name on the mailing list of the Purdue station?

These questions may seem a little difficult, but after reading Bulletin No. 110 on "Corn Improvement" from Purdue, you should answer any of them.

Wheat Bread Contest.

1. Open to any common school pupil (below the high school) who is regularly enrolled and doing creditable work, as shown by the teacher's certificate.

2. An entry will consist of one loaf. The dough should weigh one pound, and should be baked in a single pan, 4 in. x 4 in. x 8 in.

3. See Farmer's Bulletin No. 112, from the Department of Agriculture, Washington, D. C.

Corn Score Card—Trueness to type, 10; shape of ears, 5; color of grain and cob, 10; vitality, 10; tips of ears, 5; butts of ears, 5; kernel uniformity, 10; kernel shape, 10; length of ears, 5; circumference of ears, 5; spaces between rows and kernels, 10; proportion of corn, 15. Total 100.

Wheat Bread Score Card—Flavor—nutty, 35. Texture—even, elastic, but breaking readily, 25. Lightness—pores medium, uniform, 15. Color inside—creamy white, 5. Crust—color, thickness, texture, 10. Size and shape—medium, symmetrical, 5. Moisture—not dry, not sad, 5. Total 100.

Record of Corn Growing.

1. Name and address.....Age.....
   Teacher .....
2. Was seed tested before planting and how? .....
3. Source of seed and how handled from gathering to planting time?..
4. Dimensions of plat in feet.....
5. Character of soil.....
6. Character of sub-soil.....
7. Drainage.. .....
8. Crop grown on land in 1904....., 1905....., 1906.....
9. Manure used in 1904,....., 1905....., 1906....

10. Manures or fertilizers used in 1907.....
11. Date of breaking ground.....
12. Depth of breaking .....
13. Preparation of ground before planting.....
14. Date of planting.....
15. Variety of corn.....
16. Stand .....
    Any replanting? .....
17. Distance between rows.....
18. Distance between hills.....
19. Distance apart, if drilled.....
20. Date of cultivation—1st.....2nd.....3rd.....
    ..... 4th..... 5th .....; Any more
    times? .....
21. Depth of cultivation each time and reason.....
22. Any special cultivation or work.....
23. Were alternate rows detasselled?.....
24. Were weak, barren and smutted stalks detasselled?.....
25. Yield .....
26. Average No. of stalks per hill.....
27. Have you saved seed corn for next year?.....

NATURE-STUDY IN A MUSEUM

By DELIA ISABEL GRIFFIN
Director of The Fairbanks Museum, St. Johnsbury, Vt.

"What is it?" The demand was abrupt, the outstretched hands were very grimy, but the faces were filled with eagerness. A half-dozen small boys stood in the director's office and proudly presented their prize—a large caterpillar. Small heed they paid to a committee of ladies, just out from their session in the classroom, or to the Distinguished Visitor who paused by the door to view the proceedings. The boys were entirely at home,—they knew that the Museum and its contents belonged to them, and while committees might use it, or visitors wander over it, they, the children, were the true owners for whose enjoyment it was built, and for whose benefit it was administered.

As a lad of eleven years Franklin Fairbanks began his first collection of natural history specimens; at sixty he dedicated this splendid Museum to the children of his city.

The reason for their confidence is not far to seek—it is found in the spirit of the man who built and endowed the Museum. Col. Franklin Fairbanks was a lad of eleven years when he first began his collection of natural history objects. He was a man of sixty, when, that collection having grown to remarkable dimensions, he erected the Fairbanks Museum of Natural Science. At the laying of the corner-stone, he said to the young people.

"This building is to be erected for you. I want you to understand that from this time on it is to be yours, and that you are to carefully guard its interests; and I want each one of you to say to himself, 'This is my building, and I have an interest in it'." The spirit which Col. Fairbanks showed in these words still abides in the Museum, and is manifest in the various phases of educational work which are carried on by the institution, and which it is the object of this paper simply and briefly to relate.

One week of each school month, the large, attractive classroom of the building is the center of activity. Classes come from the public schools of the town—all grades from the third through the ninth—with their teachers, and receive lessons given by the director of the Museum. *Lessons* these are, not lectures. The pupils have as active a part as they would in any school exercise, asking and answering questions, and thinking out the problems which flower or bird may suggest. These lessons are part of a general plan of nature-study, arranged by the director, and carried out in the schools. The Museum lesson furnishes the key-note of the month's study, which is arranged with a view to the agricultural and industrial life of the community.

As far as possible the pupils bring the materials for their study, and these are supplemented by Museum specimens. For instance, the subject of a lesson may be the Christmas Fern. Each pupil has a frond secured by himself, while about the walls of the room hang a dozen or more specimens from the herbarium, and the variations in these cause much interest, as they are noticed by the pupils *after* their own specimens have been studied. Also, the Polypody (rare in this locality) is shown by way of comparison, and a last exhibit is the Museum fernery where both ferns are growing luxuriantly. Perhaps the best result of such a lesson is the interest which the boys and girls take in the growing plants, for they come into the Museum frequently to visit the fernery and see how the plants are thriving. Also, they start ferneries in their own homes, collecting the plants and coming to the director to compare notes, ask the cause of failure, or report success.

A class may be studying crickets and grasshoppers, and nearly every member has his specimens. These have been kept in glass jars, on the pupils' desks, for some time before they figure in the Museum lessons. Children supply the insects with food,

trying experiments to see whether they prefer grass, clover leaves, apple, sugar or grain. As good living conditions as possible are given the insects,—grassy clumps of earth, stones and pieces of wood being placed in the jars.

The specimens are brought to the Museum, and the first part of the hour is occupied with hearing the pupils' observations. After the lesson the insects are kept for a day or two, and then released. Often the children are so interested that they secure other specimens and watch them at home. In this, as in all animal study, habits and *life* are the points emphasized.

Rear Main Hall of Fairbanks Museum

Since Vermont is a state with much mineral wealth, some of the winter is naturally devoted to the study of granite, pyrite, talc, the ores of several metals which are found in the state, gypsum, marble and other calcites. The students secure many specimens, and small collections are owned by the schools of the town, but in addition to these, the Museum collection is freely used,—the classes often going to the open cases. Experiments follow these lessons, mortar, plaster and casts being made after the mineral study is concluded.

Among the subjects of other lessons thus given at the Museum may be mentioned: "Seed Distribution," "Dry and Fleshy Fruits," "Goldenrods and Asters," "Preparation of Trees for Winter," "Defensive Organs of Plants," "Frogs and Toads," "Tree Buds," and "Germination of Seeds."

In order that the interest which children have in the various forms of nature-study shall be developed to the fullest extent, it is necessary that teachers should be alive to the value of the work and should have a certain degree of knowledge regarding it. Therefore, teachers' classes are held for a portion of each year. These are conducted by the director who presents plans for lessons in the schools, gives subject-matter and methods of teaching, and places at the disposal of teachers the latest books and magazines treating of science and nature-study. Although attendance at these lectures is voluntary it is rarely that a teacher misses a meeting, and the interest is keen.

For ten weeks during the spring and early summer, bird walks are conducted in the following manner: From the middle of April to the end of June, groups of children, about a dozen in number, meet at the Museum steps at seven o'clock in the morning. They are at the school-building ready for school at nine, and meanwhile have tramped from one to two miles in finding the spring birds. Anywhere from fifteen to forty birds may be seen and heard, according to weather conditions. Some member of the Museum staff accompanies each expedition, and every child is given an opportunity to go about four times a season. Frequently, children come to the Museum during the day to examine closely a bird that could not be seen well during the morning tramp, and their interest is increased by a small case placed in a prominent position near the entrance door and containing the newest bird arrivals. Only thirty-five specimens are allowed in the case at once, and both children and adults who are studying birds for the first time find it far easier to identify a perplexing bird visitor from this case than from the larger general collection.

An interesting outgrowth of the bird walks is the Junior Audubon Society which meets at the Museum once a month, from January to June, in two divisions. Each section has its child officers, who preside, read reports, make motions, present a literary program, and in every way carry on the business of a society with much dignity and solemnity.

The June meeting is given to a bird contest, for determining which child is most thoroughly acquainted with the birds. The prizes, five-dollar gold pieces, are offered by one of the bird-loving citizens of the town. For a month before the contest every hour of the day sees eager children in front of the bird cases, and the words most familiar to the director are, "Please can you tell me what this bird is? He has a brown back," and then follows a description, remarkably accurate when one remembers the age of the observer, and usually the members of the office staff, with wits sharpened by constant guessing, are able to lead the questioners to a specimen and receive a satisfied, "Yes, that's just the bird!"

The interest in insects is not so universal as that in birds. Still, each September and October sees the caterpillar boxes well inhabited by the "crawlers" the children have brought. These cages are placed on tables in the main hall, and are the center of interest during the autumn. Caterpillars are made the subject of a Museum lesson, and in preparation for it, the classes have specimens in their schoolrooms. Here, they provide a variety of leaf food for their captives, see which kinds are eaten, how the creature feeds and moves and some of them have seen caterpillars spin cocoons or change to chrysalis form before their wondering eyes. After the lesson, the class adjourns to the main hall of the Museum to inspect the caterpillar cages. These lessons so interest the young people that hardly a day of August and September goes by without several crawlers being brought to the Museum for identification and for information in regard to their care. In the spring, butterflies and moths are brought in large numbers, but after confining these for a day or so, for purposes of observation, they are liberated,—save in the case of some rare insect much needed to complete the Museum collection.

One instance of the home study of insects may be noted: A child of ten, with a little help from his aunt, and some special good fortune from Dame Nature, has followed the life cycle from caterpillar to caterpillar of the white tussock moth, keeping the second generation until they molted for the third time.

Loan collections of minerals, birds and insects, are sent out to the schools of St. Johnsbury and of the surrounding towns. The general course of study in a grade, as well as the nature

work, is considered in making up the collections. They are accompanied by some simple books and are kept for a term of weeks, then returned to the Museum.

The last phase of nature-study to be mentioned is the flower table. From the time the first arbutus blossoms on a southern hillside, until the witch-hazel lets fall its crinkled yellow petals late in the autumn, a procession of wild flowers is to be seen in the museum. The specimens are arranged in clear glass vases on tables in a prominent part of the hall. Frequently fifty specimens are displayed at a time, and often all the varieties of one flower are to be seen the same day. One week in May the violet table held twelve varieties, all found within a five-mile radius of the Museum, and each September fifteen goldenrods are exhibited on the same table.

Flower tables. All flowers are labelled with both common and scientific names

In the case of rare flowers, some of the orchids for instance, only two or three specimens are displayed, often with a label warning the public of the danger of gathering them in quantity and so aiding in their extermination. The literature of the "Wild Flower Preservation Society" has a place on this table,

and many of its leaflets are taken by visitors. All the flowers are labelled with both common and scientific names, and if a child brings the specimen, his name also appears. There is eager rivalry among the children as to who shall bring the earliest flowers, and during May and June the table is almost entirely supplied by the young people.

This flower display is easily the most popular feature of the Museum work. Visitors come to it first, and linger by it longer than by any other exhibit; several invalids watch eagerly for the reports of it in the weekly papers; and the children, competing with each other, to see which shall bring the largest number of flowers, gain a familiarity with the specimens and with the fields and woods in which they grow. More valuable yet is the healthy influence which absorbs the children's minds and love of nature to which they unconsciously grow.

Time was when the chief function of a Museum was the accumulation and hoarding of collections. The idea of using these collections for the direct education of the public was foreign to the scheme of management, and an aggressive policy which should result in making the institution a center for the scientific interest, not only of advanced students, but of children, was a possiblity not entertained.

Today, nearly every museum in America is carrying on some form of educational work for young people under high-school age, as well as for those above, and it may not be rash to predict that, in the near future, teachers of nature-study will find in the museums of their vicinity, the most valuable aid, incentive and inspiration for their work.

AMERICAN NATURE-STUDY SOCIETY

A delay in revision of certain papers intended for March has led the editor to use that issue for the directory of members. It will be mailed next week.

THE
NATURE-STUDY REVIEW
DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

VOL. 5 MARCH, 1909 NO. 3

FIRST DIRECTORY OF MEMBERS OF THE AMERICAN NATURE-STUDY SOCIETY

The following list gives the names and addresses and, as far as known to the secretary, the official positions of members of the American Nature-Study Society who were enrolled before January 20th, 1909. The unavoidable delay in issuing this directory made it desirable to make it as complete as possible by adding about twenty names received early in January of this year.

The secretary of the Society has found some difficulty in attempting to distinguish between members of the A. N.-S. S. and subscribers to the NATURE-STUDY REVIEW. The confusion has arisen from the fact that a year's subscription to the REVIEW and the annual members dues, including the REVIEW free, are exactly the same. Correspondence shows that there is the widespread understanding that subscription to the REVIEW at the full rate automatically results in membership in the A. N.-S. S. Considering the existing confusion, it has seemed to the secretary best to include in the following list the names of all persons who paid to the Society, either direct to the secretary or through agencies (which are now required to charge the full subscription price) the amount of the annual membership fee, $1.00. The application of this rule has added to the list probably some forty or fifty names of persons who are certainly interested in the work and journal of the Society, but who do not happen to have filed formal applications for membership. In case any names should not be included as members, notice to the secretary will make sure of their omission from the next list of members.

This list does not contain names placed on the subscription list of the REVIEW at reduced rates, chiefly through clubs with other

magazines which have advertised the REVIEW. Since such subscribers have paid for a year's trial subscription less than $1.00 per year, it is clear that there could not possibly be in these cases any misunderstanding regarding membership in the A. N.-S. S. By payment of an additional twenty cents to the secretary of the Society any club rate subscription now on the books may be credited as member's fee paid for the year 1909.

The constitution provides that libraries and other educational institutions may be classed as members. They may also be represented at meetings by a designated official. The records concerning such officials are still very incomplete; but as far as known their names are given after names of subscribing institutions in the following lists.

All educational institutions have been arranged in the list under the initial letter of the postoffice address. This is best for ready reference; and will be especially valuable in showing what institutions, especially training schools for teachers, are seriously interested in the movement for better nature-study and science for elementary schools. Some surprising facts in this line can be gleaned from the alphabetical and geographical lists which follow.

Readers are requested to examine this directory and to report at once to the secretary of the Society changes needed. Please help by looking over the list of members in your own State. Especially do the records lack full names and official titles. All college degrees, except the professional M.D., have been omitted.

It is planned to publish several times this year supplementary lists with names of new members and changes in positions. Members will please keep the secretary informed.

Finally, it should be stated for the information of members that this list does not include names of persons or institutions whose dues have not been paid for at least one year credited later than 1907. For this reason this list falls below the 1000 members which it has been the aim to enroll during 1908. There is on file a surprisingly long list of applications for membership received early last year; but after two notices of election to membership by the Council no fee has been paid. In fact from 12 to 15% of applications not accompanied by remittance for first annual fee do not lead to membership. This is similar to the experience of other societies which set for admission to membership no standard

other than interest and the payment of a fee. One prominent national organization concerned with health has recently reported an expenditure of $400 per month spent in sending bills to persons who have accepted membership but continue to forget to pay the first fee. There was a similar experience with several hundred advance subscriptions to the REVIEW in 1904.

Fortunately for the financial outcome, the new United States postal rules of 1908, practically requiring paid-in-advance subscriptions, have caused the secretary to follow strictly the constitutional rule of the A. N.-S. S. and not send the REVIEW to members more than two months in arrears for annual dues. Hence the large number of applications yet unpaid have resulted in little financial loss to the Society.

The failure to reach the 1000 mark in paid membership introduces some serious complications financially, because as was shown in the first suggestions for organizing the A. N.-S. S. (this magazine for March 1907) a membership of one thousand paying $1000 per year would be needed for all purposes anticipated. Experience proves, as will be shown in the secretary's financial report to be published as soon as audited, that this estimate was safe, and that with 1000 paid memberships in 1908 there would now be a balance in the treasury in place of a deficit of over $240.00, for which, as agreed, the secretary-editor has become personally responsible. But this personal responsibility for the REVIEW can not be continued beyond the present year. It will be exceedingly difficult at the election of officers next December to find a member of the Society willing to accept for two years the work of secretary and editor and stand financially responsible for an annual deficit of several hundred dollars. It is evident that during this year there must be found an answer to one of these questions: (1) Can membership in the Society, or special subscriptions, or subscriptions to the REVIEW, be increased so as to insure for 1909 and thereafter the necessary annual income? Practically this is a question as to how the work of the Society can be made more interesting and the REVIEW more attractive to those who are supposed to be interested in scientific studies in schools. Or (2) does the long-continued very limited interest and consequent lack of financial support indicate that a special journal for nature-study and elementary-school science is *not needed* in America? Failure to find a satisfactory answer to the first ques-

tion must automatically answer the second in the affirmative, with the result that the REVIEW must cease publication at end of 1909. The secretary of the Society finds through correspondence that many prominent teachers of science believe that to allow the REVIEW to be discontinued for lack of support would be a grave misfortune, because there is no other medium for communication between those interested in the most elementary phases of science teaching.

Aberdeen, S. D., Northern Normal and Industrial School, Library.
Agricultural College, Library, Ingham Co., Mich.
Albany, N. Y., State Normal College, President's Office.
Albany, N. Y., State Library.
Albany, N. Y., Teachers Training School, Library, Dana Park.
Albert, Amalia—1416 Pullan Ave., Northside, Cincinnati, O.
Alley, Mary—Prin. Pike Street School, Goshen, Ind. (223 N. Third St.)
Allman, Walter—Canton, O.
Alvard, C. P.—Principal of Training School, Delaware Ave., Buffalo, N. Y.
Archibald, G. H.—Ashewee, Bournville, England.
Amesbury, Mass., Public Library.
Amherst, Mass., Agricultural College, Library.
Anderson, Leroy—Prof. of Agricultural Practice and Supt. Univ. Farm Schools, Univ. of Cal., Berkeley, Cal.
Anderson, Mary P.—Teacher of Nature-Study, Horace Mann School, New York City.
Andre, Elonia—Teacher of Biology, Central High School, Detroit, Mich.
Andrews, Ethan Allen—Prof. of Biology, Johns Hopkins Univ., Baltimore, Md.
Anthony, A. Gertrude—2821 Stuart St., Berkeley, Cal.
Athens, Ga., Statė Normal School, Library.
Attwood, A. E.—Principal Osgoode St. Public School, Ottawa, Ontario.

Bailey, Guy A.—Supt. of Biology and Nature-Study, State Normal School, Geneseo, N. Y.
Bailey, Liberty H.—Director of College of Agriculture, Cornell Univ., Ithaca, N. Y.
Balcomb, E. E.—Prof. of Agriculture, State Normal School, Weatherford, Okla.
Balthis, Frank K.—Horticulturist, DeKalb, Ill.
Baltimore City College, Library.
Ballard, C. A.—Professor in State Normal School, Moorhead, Minn.
Bamberger, Florence E.—212 Laurens St., Baltimore, Md.
Barber, Edgar M.—Chief Clerk, U. S. Appraisers Dept. New York City. (Prospect Ave., Hollis, L. I.)
Bardwell, Darius L.—Asso. Supt. N. Y. City Schools, New Brighton, N. Y.
Barker, Franklin D.—Univ. of Nebraska, Lincoln, Neb.

Barrett, Mary F.—19 Elm St., Bloomfield, N. J.
Barr, Jas. A.—Supt. of Schools, Stockton, Cal.
Bartholf, Mrs. Kate—Prin. of Emerson School, Minneapolis, Minn.
Barton, Alice M.—Teacher, Charles Summer School, Roslindale, Mass.
Bateman, D. T.—County Supt. of Schools, Hall of Records, San Jose, Cal.
Baxter, Charles J.—State Supt. of Public Instruction, State House, Trenton, N. J.
Beach, Grace B.—Pelham, N. Y.
Beattie, R. Kent—Prof. of Botany, Washington State College, Pullman, Wash.
Beckwith, Ada C.—Principal of Kindergarten, Rochelle Park, New Rochelle, N. Y.
Beinhart, Frieda—1264 Elm St., Cincinnati, Ohio.
Bell, Albert T.—Prof. of Botany, Nebraska Wesleyan Univ., University Place, Neb.
Bender, W. H.—State Normal School, Cedar Falls, Ia.
Benedict, H. M.—Asst. Prof. of Biology, Univ. of Cincinnati, O.
Benson, Arthur F.—Prin. of Seward School, Minneapolis, Minn.
Bennett, Lindley H.—Instructor in Nature-Study and Manual Art, Provincial Normal School, Regina, Sask., Canada.
Bergen, Joseph Y.—Author of botanical text-books, 47 Raymond St., N. Cambridge, Mass.
Berry, Evis Howard—Teacher of Science, Chapin's School for Girls, New York City (256 W. 73 St.).
Berry, Idella R.—6018 Monroe Ave., Chicago, Ill.
Bessey, Charles E.—Prof. of Botany, Univ. of Neb., Lincoln, Neb.
Best, J. E.—Enosburg Falls, Vt.
Bethel, Elsworth—Instructor in Biology, High School East Side, Denver, Colo.
Betten, Cornelius—Prof. of Biology, Lake Forest College, Lake Forest, Ill.
Bhabha, H. J.—Inspector General of Education, Mysore, Bangalore, India.
Bigelow, Anna N.—Science Dept., Chapin's School for Girls, N. Y. City (Oscawana-on- Hudson).
Bigelow, Edward F.—Author, Lecturer and Editor of "Guide to Nature," Stamford, Conn.
Bigelow, Maurice A.—Prof. of Biology, Teachers College, Columbia Univ., New York City.
Bishop, E. C.—State Dept. of Education, Capitol, Lincoln, Neb.
Black, George A.—President State Normal School, Lewiston, Idaho.
Black, J. G.—Prof. of Geology and Teacher of Nature-Study, Univ. of Wooster, O. (R. F. D. 10)
Bloomsburg, Pa., State Normal School, Library.
Blount, Annette, M.—Wellesley, Mass.
Bocock, C. E.—Prof. in Normal School, Albion, Idaho.
Bodine, Donaldson—Prof. of Geology and Zoology, Wabash College, Crawfordsville, Ind.
Boise, Idaho, Carnegie Library.

Bolger, Mrs. Elizabeth M.—Teacher of Grade 5B, P. S. 168, Manhattan, New York City (511 W. 179 St.).
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North Carolina—Chapel Hill, Coon, Fitzgerald, Greensboro, Stevens.

North Dakota—Fargo, University.

Ohio—Albert, Allman, Benedict, Beinhart, Black, Braam, Brooks, Cincinnati, Clephane, Cleveland, Copeland, Cramer, B. M. Davis, E. C. Davis, Delaware, Diemer, Doan, Donnelly, Flick, Guyer, Hall, Hansen, Hargitt, Ishihara, Jacobs, Kelly, Kirkendall, Klemm, Kuersteiner, Mc Gowan, March, Mercer, L. K. Miller, Mohler, Oxford, Parks, Patton, Rinehart, Schell, Scholle, Shilladay, Spellmire, Thomasmeyer, Wilson, Wooster Zumpelman.

Oklahoma—Balcomb, Weatherford.

Oregon—Hill, Hull, Monmouth, Power.

Pennsylvania—Bloomsburg, Broomall, California, Cushman, H. B. Davis, Davison, Easton, Ehinger, Fels, Fisher, Hartline, Hirt, Hopkins, Lyte, McConnell, Miller, Mills, Philadelphia, Pittsburg, Reynolds, Satterthwait, Singer, Shively, Schmucker, Shaw, C. A. Smith, Stewart, Wells, Westtown, Williamsport, Wilson.

Rhode Island—E. Providence, Holbrook, Kingston, Providence, Putnam.

South Carolina—Pollitzer.

South Dakota—Aberdeen, Madison, Spearfish.

Tennessee—Memphis, Nashville, Stratton.

Texas—Denton, Kesler, Galveston.

Utah—H. H. Cummings, J. M. Cummings, Logan, Paul, Provo.

Vermont—Best, Criffin, Randolph Center.

Virginia—D. W. Davis, L. L. Davis, Farmville, Gillette, Hamaker, Hampton, James, L. F. Jones, Mosher, Plecker, Poindexter, Richmond, Venable, von Shieling, Williamsburg.

Washington—Cheney, Beattie, Bosse, Cook, Ellensburg, Spokane, Walla Walla.

West Virginia—Crow, Huntington, Mannington, Nolan, Reese, Shawkey, Sheldon.

Wisconsin—Christiansen, Cole, Gilbert, Hatherell, McCaskill, Madison, Marshall, Milwaukee, Mitchell, Neystrom, Oshkosh, Platteville, Reedsburg, Stevens Point, Terry, Vitz, Whitewater.

Wyoming—Laramie.

Canadian Provinces—*Alta*, Calgary; *British Columbia*, Bruce; *Nova Scotia*, Mackay, Soloan, Spencer, Shaw, Truro; *P. E. I.*, Seaman; *Ontario*, Attwood, Brunt, Calvert, Dearness, Finn, Gibson, Guelph, Ivey, James, McCready, McCarten, Orangeville, Peterboro, Scott, Silcox, Toronto, Turner; *Quebec*, Dawson, Lochhead, Macdonald, Montreal; *Sask*, Bennett, Edwards, Regina.

Foreign—*China*, Gee; *England*, Archibald, Osborne, Turner; *Germany*, Schoenichen; *India*, Bhabda, Fleming, Zumbro; *Japan*, Nakamura; *P. I.*, Ledyard; *S. Africa*, Lamont, Sister Eva, Duerden; *Turkey*, Marsovan; *S. America*, Joviano.

THE
NATURE-STUDY REVIEW
DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS
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THE RELATION OF NATURE-STUDY AND AGRICULTURE IN ELEMENTARY RURAL SCHOOLS

By DICK J. CROSBY
Specialist in Agricultural Education, U. S. Office of Experiment Stations

[Read at a meeting of American Nature-Study Society, Baltimore, Dec. 29, 1908.]

In opening this discussion on the relation of nature-study and agriculture in elementary rural schools, let me try first to clear the ground a little; that is the first thing the farmer has to do—clear his ground. I want to remove some of the misconceptions concerning agriculture as a school subject. In other words, I want to anticipate some of the criticisms likely to arise, some of the objections to the subject that have been raised by school men. Like most farmers who choose to "grub" among the rocks and stumps on "new land," I shall probably spend most of my time today clearing away obstructions, and leave the cultivation of the soil to those who follow me in the discussion.

As the first clearing process let us consider the purpose of teaching agriculture in the elementary rural schools. The purpose is not to teach a trade. At least I am sure that none of us would advocate the introduction of agriculture into the elementary schools for the purpose of teaching the boys a trade or of putting them under an apprenticeship. There is no place in the first eight grades of the rural school for trade teaching. And moreover, apprenticeship is not a necessary accompaniment of learning the principles of agriculture. Agriculture is more than a trade.

The purpose is not to keep the boys on the farm. It is not a function of the public schools to *keep* boys anywhere, except possibly (to use a questionable American idiom) to keep them

moving. The chances are that the boy who is *kept* on the farm will not make a good farmer, and we want *good* farmers rather than *more* farmers. There are *enough* farmers now; there will always be enough. But there are too many *poor* farmers. What we need in this country is not *more* farmers, but *better* farmers. What we expect of the rural schools is not that they shall *make* farmers, but that they shall stop *unmaking* farmers; not that they shall attempt to improve farmers or farming *per se*, but that they shall open the boy's mind to see and understand himself and to see and understand the natural and social environment in which he lives. In that environment nearly all of the country boys will spend a few of the best years of their lives, and many will take up their life work there. It is a function of the rural public school to bring about a proper adjustment between the country boy and his environment, not primarily that he may be kept in it, but that he may understand and enjoy it, that it may afford him the highest possible degree of pleasure and comfort and profit.

It is quite generally recognized in theory, at least, that education should proceed from the known to the unknown, from the concrete to the abstract, and that the mastery of books is but a means to education, not education itself. An individual may be versed in the classics and have an intimate knowledge of the sciences and arts and yet be uneducated—nothing more than an intellectual monstrosity. No man is truly educated until he is able to know and control himself, to support himself and family, and to take his place in the social organization of which he is a part. He must be a producer. He must contribute something to the progress of the race.

Another generally accepted proposition is that normal development comes only with the constant and active use of all the faculties and powers of mind and body. Hand, head, and heart should be trained symmetrically and at the same time.

If now we are agreed that education should adjust the individual to his natural and social environment, that it should begin with familiar, concrete things, that it should encourage and help him to be a productive member of society, and that it should constantly contribute to the symmetrical development of all his faculties,—if we agree upon these premises, we shall not draw widely divergent conclusions concerning the functions of the

rural elementary school, nor differ seriously on the relations of nature-study and elementary agriculture.

We shall agree that education in the country should begin with the *things* and *affairs* of the farm and home, and that the three R's are not the fundamentals of education but are means of acquiring and communicating knowledge of the fundamentals. The *things* of the farm and home are largely animals, birds, insects, plants and other natural objects, knowledge of which is acquired by nature-study. The *affairs* are the business and practice and principles of farming and home-making, which we call agriculture and home economics. With the latter subject this paper is not supposed to deal, so I shall speak only of nature-study and agriculture for the boy.

It would be difficult to define nature-study and agriculture in such manner as to tell where the one leaves off and the other begins. I doubt whether there *is* any clear distinction or whether we care for one. I believe both should begin with the earliest training of the country boy and neither should be entirely omitted in his subsequent training. Nature-study is both more and less than agriculture, and agriculture, even in the elementary school, includes much which cannot properly be termed nature-study.

But for the convenience and guidance of teachers who are compelled to administer instruction by means of more or less complicated machinery, we must have definitions, as well as text-books, courses of study, schedules, and the like.

For convenience's sake then, we may say that nature-study deals with the natural objects and phenomena coming into the environment of the child, and agriculture with the theory and practice of producing and using plants and animals useful to man. Likewise for convenience's sake, we may say that nature-study should precede the formal study of agriculture, and that in so far as nature-study deals with the natural objects of the farm it is an excellent preparation for agriculture. Of course I am aware that the nature-study teacher who works under such a division of the field could have nothing to do with domestic animals or with plants improved by cultivation, breeding or conscious selection, but again for convenience's sake, I am sure that agriculture would be willing to concede to nature-study all that part of the field which deals with the informal study of plants, animals, and other natural phenomena, either wild or domesticated.

With this definition, and working upon the hypothesis that nature-study should precede agriculture, let us work out a tentative plan for nature-study and agriculture in the eight years or grades usually found in the better rural elementary schools. These grades may be conveniently divided into three groups, as suggested by Davis in his bulletin on School Gardens for California Schools.* Group I includes grades 1 to 3, children 6 to 8 years old; Group II, grades 4 to 6, children 9 to 11 years old; and Group III, grades 7 and 8, children 12 to 14 years old. The work of the first two groups should consist largely of nature-study supplemented by school and home garden work; that of the third group, elementary agriculture, with illustrative demonstrations and practicums or experiments. In general the work may be divided as shown in the table on the following page.

In preparing this table we have endeavored to make the work progressive throughout, because we believe that in nature-study and agriculture, as in other work, the teacher should have a definite plan of instruction in which the educative effect of the work on the child's mind should be carefully considered. This plan need not be revealed to the child, and much less should it be reduced to written or printed form for him to learn. It is well, however, for the teacher always to remember that while it is comparatively easy to interest and excite a child, it is more difficult to both interest and instruct him. Book work and the ordinary formalities of learning and reciting set lessons should be excluded from nature studies. The problem is to take advantage of the spontaneous curiosity of the child and so direct it by a subtle and unperceived guidance that the charm of original quest and discovery of natural objects and phenomena will not be lost and that the finding of one thing will lead on to the finding of another until at length the child realizes, though it may be unconsciously, that the secrets of nature are united one with another in most delightful and useful ways. The pupil's individuality of interest, thought, action, and expression should also be cultivated and strengthened, while accuracy of perception, execution, and statement should at the same time be stimulated.

Book work will come naturally, later in connection with the agricultural work, seemingly as a result of a demand on the part

*This magazine Nov. 1905, vol. I, p. 272.

Nature-Study and Agriculture, by Groups.

Group I.	Nature-study.	School gardens.
Children 6–8 years old. Grades 1–3.	OBSERVATION. Observe wild and cultivated plants, trees, insects, wild and domestic animals in environment at home and near school.	Plant and grow some of the common hardy vegetables, such as radishes, lettuce, beets, and carrots, and one or two quick-growing flowers, such as dwarf nasturtiums.
Group II	Nature-study	School and home gardens.
Children 9–11 years old. Grades 4–6.	OBSERVATION and COMPARISON. Observe weather, soils wild and cultivated plants, trees, insects, wild and domestic animals in environment of school district and vicinity; compare habits of plants and animals in order to become familiar with their different modes of living, their struggles for existence, and their uses to man.	Plant and grow typical economic plants of the region, giving some attention to different varieties, and to the relation of crops to different conditions of soil, weather, treatment, etc.
Group III.	Agriculture.	School and home gardens.
Children 12–14 years old. Grades 7 and 8.	OBSERVATION, COMPARISON, and JUDGMENT. Study objects as above, within and beyond horizon of children's observation; introduce text-books and reference books on elementary agriculture as sources of information concerning objects beyond the limits of personal observation; illustrate processes by simple experiments; study different types of plants and animals; visit typical farms; teach sources and uses of agricultural literature—books, bulletins, and farm journals.	Plant and grow different varieties of crops, e.g., wheat, barley, sugar beets, potatoes; introduce exercises in pruning, grafting, making cuttings. Encourage pupils to grow crops, poultry, and farm animals at home, keeping account of labor, fertilizers, feed, gross and net returns, and have them experiment on different methods of planting, cultivating, harvesting, and preparing for market.

of the pupils for information concerning the affairs of agriculture which do not fall under their observation or cannot be explained from their previous experience or that of their teacher. Introduced in this way, the text-book of elementary agriculture comes as the boy's friend, not as an additional subject to be mastered or another obstacle to be overcome.

Fundamentally then, the teaching of nature-study and agriculture in the rural elementary schools is an attempt to educate the boy through his environment. Theoretically it might be

desirable to omit the text-book entirely and teach these subjects orally, making them the basis for his education along all lines, and it is possible that this may be done when our educational system has further developed and our educational ideals have more completely changed—when our schools have been "re-directed."

Practically we cannot afford to wait for such an evolution in methods of teaching to be completed. We must take our schools as they exist today, with all their faults in theory and practice, and attempt to deal reasonably with such means as seem to be available for their improvement.

Nature-study and agriculture are subjects which promise much for our rural schools. And they should not be treated as merely a new point of view. To the teacher struggling to find her bearings in the chaos of thirty recitations a day, they are more than that; to the country boy in the typical rural school they are much more than a new point of view.

THE RELATION OF NATURE-STUDY AND AGRICULTURE IN THE COUNTRY SCHOOL

By F. L. STEVENS

N. C. College of A. and M. A., Raleigh, N. C.

[Read at meeting of American Nature-Study Society, Baltimore, Dec. 29, 1908.]

With the thinking teacher, it goes without saying that this relation is and should be a most intimate one. They are triply and inseparably related in country life; in object or function, opportunity or material and in interest. They are related in their object to make for general culture and as well as for good farming. They are related in opportunity and material for the agricultural material affords abundant material for the nature-study. Perhaps most important of all they are related in interest, the interest already active in the child, that does not need even to be awakened.

Interest appeals to me more than any other educational factor, perhaps because I recognize clearly that it played a dominant part in my own education. I studied and I worked because I was interested and for no other reason, though possibly I ought to be ashamed to say so. Interest always has dominated my activities. It still does. I follow the development of nature-study and agriculture and of botany because of my genuine in-

terest in these things. [These remarks pave the way for the next sentence in a manner that I did not note until rewriting.] With interest even the dullard will think, the lazy will work, the mischievous will become studious. [I must beg my own pardon.] Interest seems to me to be, far and away, the one most important thing to the individual, to the school, to the teacher and more; *to productive activity in any field*. I have long regarded it as the primary function of nature-study to instil into the pupils a love of nature, not the facts of nature. To open the mind to inquiry and observation and to prepare it to acquire facts for itself.

The spirit of love of nature is everything. The facts remembered are nothing. If the learning of facts as a task be forced upon the pupil, they are worse than nothing because they become repellent rather than attractive to more knowledge. When learning becomes drudgery, the habit of learning ceases to grow, at least as regards the kind of knowledge that created the dislike.

The child must be led to nature-study by this the easiest path, interest, and this path will then conduct him to the other interests of the school. While nature-study in city or in country has ever embarrassing richness of subject-matter which is admirably fitted to serve the general purposes of nature-study, the material of the country can serve not only the general purposes usually assigned, but also can serve a special purpose as well. At the same time that they are nurturing in the heart of the child that love for the country and country life and country things, that thirst for knowledge of the out-of-doors, they can develop a specific interest in things agricultural, a special knowledge of the materials of agricultural practice, and even a peep at some of the principles of this wonderful, mysterious awe-inspiring fundamental art of humanity.

The nature-study of the country school may therefore to great advantage use largely as its subject-matter things agricultural. Create, direct or enlarge an interest and incidentally give some knowledge to the country child concerning such things as the corn or cotton plant, its roots, flower, fruit, history; of the cow, habits, digestive peculiarities, structure; of the parasitic insects, life-histories, structure, etc.; the emergence of the plantlet from the seed, etc. Surely all of the educative factors lie here as abundantly, yes, much more abundantly than with the golden-

rod, the gall of the golden-rod, the crawfish. Why must we go to the relatively unimportant and useless for our lesson when the vitally important give the same lesson with a ready created interest, with facts of more real value and concerning which we as teachers have a much larger fund of knowledge from which to teach. My whole point is this, let the subject-matter of country nature-study be largely agricultural. Such nature-study may then be regarded as elementary agriculture; partly so, not entirely, for I would leave room for some non-agricultural nature-study. Yet elementary agriculture is not nature-study. Elementary agriculture is much more, and such nature-study as this would serve to pave the way admirably to the elementary agriculture to follow, having laid the foundation with some facts and quickened and enlarged interest. With the transition to elementary agriculture proper,. there will be a change of method, a more intensive study, a definite and premeditated, rather than merely an incidental, accumulation of facts and principles. The nature-study of the lower grades will lead up to and gradually develop into the elementary agriculture of the higher grades.

THE RELATION OF NATURE-STUDY AND AGRICULTURE IN ELEMENTARY RURAL SCHOOLS

By E. DAVENPORT

Dean of the College of Agriculture, University of Illinois

[Read for the author at meeting of the American Nature-Study Society, Baltimore, Dec. 29, 1908.]

Agriculture in the high school, like agriculture in the college, in my opinion, should be considered as a strictly technical subject taught primarily for vocational purposes. Aside from this, however, it has a distinctly educational value of its own and is worth teaching for pedagogic reasons. In the grades, I take it, there is little opportunity to teach agriculture primarily for vocational purposes, so that in the elementary schools whatever we may be able to do along agricultural lines is largely of the order of nature-study.

Agriculture, however, even in the grades, is something more than ordinary nature-study. It is nature-study plus utility. It is nature-study with an economic significance. It is nature-study which articulates with the affairs of real men in real life.

It is nature-study in which the child may even influence the processes. It is nature-study which distinctly stimulates industry.

When the pupil is sent to study the tree, the bird or the insect, the most that he can do is to observe and record. This is all good in its way, but the tree, the bird and the insect are self-sufficient unto themselves or, at least, are in no sense dependent upon the boy, nor are they of much consequence to him or his except in an esthetic sense.

When, however, the boy is set to studying the pig, the matter of utility at once enters in as a factor of the problem. The pig is worth something and the boy can see it. He can see how the bare existence of the pig is dependent upon regular feeding which he, himself, may give; and how the pig, when he is brought to a finish, is capable of contributing not only to the support of the boy's body but can be sold for money with which may be purchased many things dear to the heart of a boy. He sees, in other words, how he, himself, may influence the production of pigs and if he has even a fair share of that creative activity which most boys possess, it will be stimulated into action by the prospect.

If he is set to studying the cow and her milk, especially if he learns how to compare one kind of milk with another, or if his attention is even directed to the conditions under which different kinds may be produced, he sees in concrete ways how nature behaves in her workshop, what it is that nature is doing, day by day, and how it is that these activities are connected with the affairs of men. He cannot help but see how the family that owns good cows has an advantage in the world over those whose cows are poor or ill-fed.

If he is set to studying corn he knows at once that he is dealing with a crop whose management is in the hands of man, with something that does not exist for itself alone and that would not and could not exist except for man's attention. All this helps to stimulate activity and productive energy on the part of the child, which is one of the things we need to nourish when we take children out of real life for a considerable length of time and put them into that artificial world we call the schoolroom.

So we might assign the whole gamut of topics agriculturally and show how their study stimulates and satisfies something

more than curiosity or even observation and record, how they reach out and take hold of the very life of the boy, and how they connect the affairs of the school and the school-room with those of his home and the neighborhood and the world into which he is already anxious to plunge and make himself known and felt.

One of our problems in education is how to give the child information and teach him methods of acquiring more without destroying his creative instinct; how to compensate in the school for some of the damage we have done in taking him out of real life during the educative process. Now nature-study in itself is good. It is more than that, it is excellent. It stimulates a love for the material that is around us. It stimulates observation as to what is going on, and it gives practice in making accurate records of what is seen; but if nature-study can extend into the realm of the useful, into the region of the productive, into the realm where human relations are involved, then so much the better.

This is the possibility of agriculture as a subject for study in the grades. The large question is the teacher. To what extent can the grade teacher know the field well enough to use it to advantage for these purposes? The only answer is that all too often the teacher is unable to make proper use of this mass of the best material in the world for teaching processes and that lies close at hand, which is the old story over again of looking afar off for the things that after all are close by; but in this, as in many other things, even though the ideal cannot be attained, an honest attempt is well worth while, and if the teachers can be induced to combine, along with observation and record, the elements of usefulness and the human relation, then it will be well worth all it costs to stimulate as much as possible the teaching of agriculture in the grades of the public schools. Moreover, as this subject makes its way into the high schools and the normal schools the time will not be long until teachers will be developed with the training and the material to go out into the world of the children and hold up to them a fairly true picture of the world in its industrial activities.

NATURE-STUDY AND ELEMENTARY AGRICULTURE

By C. H. ROBISON

Montclair, N. J., State Normal School

[Discussion at meeting of American Nature-Study Society, Baltimore, Dec. 29, 1908.]

The preceding speakers have so ably covered practically all the points touched upon in the remarks which I have written, that I think the time allotted to me on the program can be more profitably used in considering certain questions suggested by the tabulated summary of Mr. Crosby's tentative course of study which he has placed on the blackboard before us. His plan is suggestive, and the topics for practical plant work he has outlined in the third column are admirable. However, I wish to point out the necessity of avoiding repetition, when the details are worked into this outline. The nature-study movement has suffered from the lack of the organization of its materials more than from almost any other cause. What organization has been attempted has often failed to proceed according to pedagogical principles. Other studies in the elementary curriculum have progressed in efficiency only as they have done this. This lack of organization of the abundant materials brings about a sameness from grade to grade that threatens the same disastrous results, pedagogically, that we find in the common school physiology required by law.

I believe it is sound to maintain that the purpose of having nature-study in the lower grades, certainly in the first and probably in the second, is not for the intrinsic value of the facts learned from observation, nor necessarily for a supposed training of the so-called faculty of observation, but that its function there is to help widen the experiences of the child for the express purpose of aiding the work in English, in expression, which is the chief work of the lowest grade, and of contributing to the efficiency of the number work begun in the first or second grade. The same planting of radishes and lettuce year after year, even though the process become more perfect and the crop better, is quite sure to cause that same paralysis of interest which our presiding officer once aptly illustrated in an address by citing the universal habit of trotting out the venerable milkweed pod in the

successive grades. I believe this garden work should be so varied in its character, at least after the first two or three grades, that it should stand for a distinct idea each year, and that there should be sufficient contrast in successive years to insure the work against the deadening tendency just referred to. Thus the work of one grade, as the fourth, might abandon work with vegetables or decorative plants, and be devoted to small plots illustrating various staple crops, even though they be not typical of the locality. This would give concreteness to the work in geography just at a time when a connection is being made between the home geography and the wider outside world. Such diversity and contrast should characterize not only the garden work, but also the work with weeds, birds, trees, and insects.

It might be well also to raise the question whether there is any such difference in the learning process as seems to be indicated in the second column, which assigns observation to the first three grades, observation and comparison to the next three, and adds judgment to these in the seventh and eighth grades. Child studies would seem to indicate that children have a capacity for forming judgments and for correcting them by comparison from a very early age. One great defect, until very recently, of our system of elementary education has been that we have not given small children opportunities for forming judgments, and have not encouraged initiative. Perhaps we should regard these mental abilities as differing only in degree from year to year, and base our procedure on that assumption.

In one sense elementary agriculture is the rural phase of nature-study, which is the same in the earlier years for both rural and urban localities, but which in the higher reaches of elementary school work becomes somewhat differentiated as to material rather than in method. In another sense, elementary agriculture is the rural phase of industrial education, of which manual training is at present a very imperfect and unsatisfactory urban expression. For really manual training is but a method without a content of its own, and a method which elementary agriculture itself is making use of in the public schools. In this sense, elementary agriculture is broader than nature-study in the upper grades.

AGRICULTURE IN PRIMARY SCHOOLS

The following extracts from the *School Bulletin*, which published the full address by Commissioner Draper of the New York State Education Department, are worthy of serious consideration by those planning so-called agriculture for schools below high-school grade:

"The agricultural situation is absolutely distinct from any other industrial situation, and if it is ever met efficiently it will have to be met in a very distinct way. It will never be met by making the agricultural schools of the country primary schools. The children are too young to want much agriculture in the elementary schools: they want English, and mathematics, and the elementary sciences there. The primary children in the cities stand more in need of agriculture, than the primary children in the country. The primary schools in both city and country are all-around schools. Some of the city children will go to the country; some of the country children will go to the city. The education of the country child is not to be narrowed down to things rural. His books are not to exclude illustrations from, and all other recognition of, rural life, but neither are they to exclude all else. His primary school is to be able to train him in the fundamentals of an all-round man, who will be free from all exclusiveness, and able to study and do to the best advantage anything that his qualities and his tastes may dispose him to study and to do when the time comes.

"We could not establish exclusive agricultural schools of primary grade, even if we were to get wrong-headed and undertake it. All schools require balanced work until the time for specialization comes. Balanced work requires elements that relate to the country as well as those that relate to the cities, and vice-versa. There are higher laws and fundamental principles concerning education, and they bear alike upon all parts of the country and upon all manner of people. If we violate these laws or break these principles, the people soon come to realize it and trouble is, as it ought to be, let loose upon us.

"We have heard much about nature-study. I recognize its value. I intend no offence to those who have much pleasure in

it. It is good. But it is equally good for *all* children, as cutting paper, and weaving mats, and moulding clay, and the like, are good for all children. All of these things make for all-around culture, for all-around outlook, and for all-around love for work and for facility in doing. Nature-study is quite likely to appeal less to the country child than to the city child for obvious reasons, and, while it is to be encouraged in the country as in the city, it apparently has about the same relation to real agriculture that sloyd has to laying out an electric plant for a city, or laying down the keel for a battle-ship. In other words, it is a good thing—a good thing everywhere, because it helps mould the character of boys and girls and keeps the way open for what may come after, but calling it agricultural instruction will not increase its importance so much as it will confuse some minds and subject us to the criticism that we are not doing what we proclaim.

"We are asked to encourage the teaching of agriculture in the elementary schools. I am for doing it so far as is practically possible. I admit, however, that I am at a loss to know what are the phases of real agriculture which are adaptable to the primary schools, or how to install them in ways that will dispose children to become interested in them. I know of many things which look to quickening and dignifying the different agricultural industries, in which the children of farmers are likely to find interest and which are not incompatible with the plan and purpose of the elementary schools, and I am for introducing them into the course of study; but I confess that I am unable to see the reasonableness or the practicability of teaching real agriculture, any more than engineering or medicine in the elementary schools. Agriculture is not an elementary subject."

COMMITTEES OF THE AMERICAN NATURE-STUDY SOCIETY

The Council has appointed the following committees which will be expected to consider the possible lines for useful work of the Society from the several standpoints suggested by the titles of the committees. Each committee is authorized to add new members or to form sub-committees. It is expected that the Council will reappoint these committees annually so as to give

the work continuity in progress for several years. Reports of progress will, from time to time, be published in THE REVIEW. All conclusions of these committees must be submitted to a general vote of the Society for approval or rejection.

Committee on Physical Nature-Study—C. R. Mann (chairman), J. F. Woodhull, J. W. Shepherd, H. N. Loomis, H. H. Cummings.

Committee on Industrial Education and Nature-Study—O. W. Caldwell (chairman), W. A. Baldwin, W. Lochhead, E. Davenport, F. E. Bonser.

Committee on Nature-Study in Relation to High-School Biology, (will probably be extended to high-school science later)—G. W. Hunter, (chairman) C. F. Hodge, W. F. Ganong, M. A. Bigelow.

Committees on Nature-Study and Agriculture, (obviously overlaps industrial education, but has some specific problems)—D. J. Crosby (chairman), B. M. Davis, E. E. Balcomb, F. L. Stevens, A. G. Graham.

Committees on: elementary-school physiology and hygiene, principles of nature-study, nature-study in relation to geography, nature-study literature, and training teachers in normal schools, are under consideration and will probably be appointed this year.

NEW YORK CITY SECTION OF AMERICAN NATURE-STUDY SOCIETY

A meeting of this section was held on Saturday, March 6th at Teachers College, Columbia University. Mrs. Alice R. Northrop presided. The program consisted of the reports of two committees, one on "Nature-Study Best Adapted to the Congested Regions of New York City," reported by Miss Emma Sylvester, Principal of P. S. 35; the second on "Nature-Study for the Suburban Districts," reported by Professor F. L. Holtz of the Brooklyn Training School for Teachers. These extremely interesting and valuable reports will be very helpful to teachers of nature-study and it is hoped to have them prepared for publication.

The section elected the following officers for next year: Chairman, Professor F. L. Holtz; Members of executive Committee—Dr. G. Straubenmuller and Dr. D. E. Bardwell, Associate Superintendents of Schools; Mr. H. G. Parsons of the Children's School Farm; Dr. H. L. Kelly of the Ethical Culture School; Mr. G. H.

Trafton of the Passaic, (N. J.) Schools; Miss Emma Sylvester, Principal of P. S. 35; and Miss Margaret Knox, Principal of S. P. 15.

The section now has many more than the one hundred members necessary for representation in the council of the A. N. S. S., and Mrs. A. R. Northrop was elected the delegate of the section to represent it in the council of the A. N. S. S. for the years 1909–1910, as provided for in the constitution of the society.

DISCUSSIONS

[EDITOR'S NOTE.—These two interesting letters arrived in December, but the special issues delayed publication.]

Economic Biology in Schools. May I offer a few greatly belated suggestions apropos of Professor Hodge's article in the September, 1908 number of the REVIEW and Professor Ganong's in the November number?

It has for a good while been evident that in the work of grammar and secondary schools there is a decided trend towards emphasizing the practical or economic side of most biological subjects. Comparing most school "physiologies" of today with those of a decade or two ago, the amount of bone-counting and of memorizing of physiological constants is considerably less and the amount of matter relating to personal, domestic and civic hygiene is notably greater in the recent text-books. In zoölogies there has come about a similar, though less marked change. In botanies, too, much space is now often given to many kinds of economic topics, ranging all the way from the rudiments of agriculture to the discrimination of edible fungi. One of our leading botanists lays it down as a principle that plant anatomy and physiology should be discussed in secondary school text-books mainly with reference to the structure and functions of familiar plants of the farm and garden.

Before saying anything in praise or blame of this economic direction given to biology teaching one must first decide what is the object of the teaching. I heartily agree with Professor Ganong that both the information and the training to be derived from the well directed study of zoology and botany are exceedingly valuable and that both subjects must be studied in a broad and culturing way. As regards the study of the human animal

there is much to be said in favor of making the work largely hygienic. Organic structure and many life-processes can best be learned from the examination of plants and the lower animals, but human hygiene is a special subject and of immense importance to the race. But our knowledge of the world is bound to be wretchedly imperfect if we study only such animals and plants as are of economic value. Think of the perspective of the pupil instructed in the life habits and the modes of destroying scale-insects, bacteria and blue mold but with no knowledge of the intelligence of the higher insects and no conception of the structure and functions of the higher plants.

Let those of us who care for the teaching of biology of every sort not be unduly modest. Why must our subject be cut down to that which is merely economic any more than the other sciences are? How many physiography teachers would be satisfied to deal mainly with the possibilities of the adjoining country for better graded and better ballasted roads and the opportunities for draining or irrigation? How many physics teachers would limit their instruction for the most part to such subjects as the simplest cases of applied mechanics, house-warming, electric bell-hanging and kindred topics? What secondary school classes in chemistry are drilled mainly on the principles of manufacture of chemical fertilizers, soap-making, economical combustion of fuel and so on?

To conduct our botany teaching today mainly with a view to the economic importance of plants is to take a long step backward toward the attitude of the old herbalists, who studied and described plants mainly with a view to their use in medicine. Better than any mere knowledge of what we can get out of plants and how we can keep injurious species from preying upon our fields, our gardens or ourselves is the conception of the plant world as the nutritive basis of all animal life, the embodiment of the simpler life-processes and the decorative garment of the earth itself. No judicious teacher of the subject will fail to avail himself of such common sources of plant material as the nearest market stall and the weed-covered vacant lot afford, but he will not stop there. He will find in a well marked plant formation (or if need be in a good photograph of one) just as legitimate material for his classes as is afforded by a moldy banana.

Cambridge, Mass. J. Y. Bergen.

Practical and Scientific Biology. Professor Ganong's article on nature-study and science courses is of extreme interest to those teachers in the East who are working hard to find the middle ground between evolutionary biology and so-called practical biology, especially with reference to the teaching of younger pupils. "Practical biology" is a rather hazy expression at the present time, but as time goes on we begin to see more clearly just what this expression connotes.

As we work over these so-called practical topics we are able to observe the attitude of our students towards them. Evolutionary science is necessarily taught from the standpoint of its own content, hence there is a minimum possibility of shaping it to the needs of young students, or to particular geographical locations. Its goal is the understanding of certain generalizations which on account of their somewhat philosophic character do not always appeal to the minds of adolescents. On the other hand the guiding principle of the practical work must be that of accommodation to the needs and capacities of the students.

It seems to me that there is no better way to reconcile these two somewhat antagonistic views than that of combining them wherever possible. Thus for example in botany our typical synthetic course demands a study of seeds and germination. Now, after studying these things and performing the usual experiments, many good students ask what the practical bearing of all this is. If we then show them by lantern lectures, demonstrations, exhibits or other means that plowing, harrowing, and cultivating have a definite relation to the problems of warmth, moisture, and air supply as studied in the experiments, we find that the latter grip the pupil's mind in a way that makes us think that our teaching is really accomplishing its purpose. Again, in studying seeds the pupil worries through the terminology—epidermis, epicarp, endocarp, testa, tegmen, endosperm, and so on. All these take on a new meaning when he applies them in a study of the processes of grinding and bolting in our great flour mills.

When we come to study the stem, the topic of forestry and lumbering is usually thought of as being the practical phase. It is *a* practical phase, but only one of several. Dr. Hodge suggests the study of forty trees in detail. It is difficult to see of what use such an amount of detailed information could be to

the average person. Rather, instead of studying so many trees take up other practical phases like stem-fiber products, stem-extractives, and edible stems.

The same method is applicable as well in zoology. One of our most-prized lessons in evolutionary biology is the one on frog embryology. If we follow this up with some lessons on fish hatchery and state and national work on fish preservation, the development of an animal from egg to maturity connotes more, even to the dull and average minds of which Professor Ganong speaks than it otherwise would.

Some typical calculations showing the relations of birds as insect and rodent destroyers are always interesting in connection with the study of structure and function in birds, but to trace out such economic relations in 100 birds with one's class, as suggested by Dr. Hodge, would be a weariness to the flesh. Rather call to mind by a few specific cases the appalling destruction of bird life in this country, and the means for checking such destruction.

The things that the average person is to learn from a study of insects are hardly to be deduced from a study of 150 insects. Professor Ganong is quite right in assuming that most people are not as much interested in the economic relations of 150 insects as they are in the cell-theory of biology, for example. Nevertheless if we study with our pupils the economic relations of insects as a class, and of a few typical examples, we may still have ample time to introduce into our courses such illuminating ideas as are represented by the cell-theory.

CHESTER A. MATHEWSON.

High School of Commerce,
New York City.

NOTES ON BOOKS AND PAMPHLETS

The Study of Nature. By S. C. Schmucker. Philadelphia: J. B. Lippincott Co., 1908. $1.25.

This book, by Professor Schmucker of the West Chester (Pa.) Normal School, is volume VII in Lippincott's Educational Series, edited by Martin G. Brumbaugh. Although many of the ideas brought out in the discussion of the aim and purpose of nature-study have been expressed by a number of other writers, they are here made most forceful by well chosen illustrations and examples. The author is evidently in sympathy with nature-study and her teachings.

Without doubt the most practical part of the book for teachers is the section including the chapters "The Teacher's Preparation," "The Work in the Schoolroom," and "The Equipment of the Schoolroom." This is the kind of help that will enable teachers to make their nature work a success. The suggestions and directions of these chapters are evidently the outgrowth of extensive experience in handling plants and animals and of a close touch with the interests and activities of children.

The half of the book devoted to the materials of study is interesting and instructive, but does not contain much suggestion concerning the use of the material mentioned and described. The author considers animals preferable to plants for study, and so takes seven chapters for animal study, in contrast to two for plants and one for the heavenly bodies. These ten chapters contain the plainly observable and easily understood facts concerning the more common animals, plants and planets. There is gathered here information that is really useful to a nature-study teacher who has not the time to search the several authorities. It is suggestive rather than exhaustive.

The course of study is outlined for four grades and is full of suggestion. The questions are excellent problems for ready solution by observation.

The book references are excellent though few in number. The brief comment on each book is helpful. The advice to keep to nature and away from books is good.

That there is so little said about the school-garden seems to be a defect in the book. The author shows himself to be in sympathy with the best kind of school-garden, and it is unfortunate that he did not expand the ideas touched upon in the first chapter. The illustrations are worthy of mention as they really *illustrate* the point or points intended. The index is complete and the book is fairly well cross indexed. One of the commendable features is the presence of marginal topics, which make clear to the eye just what topics are discussed on the page. The usefulness of this book to an earnest teacher can not be doubted.

State Normal School,
Cortland, N. Y. L. S. Hawkins.

Biology and its Makers. By William A. Locy. New York, Holt, 1908. Pp. 479, 123 figs.

A very readable account of biological history, tracing first the sources of the great ideas and, second, giving special attention to the doctrine of organic evolution. Especially interesting are the biographical notes on great men of science. The illustrations are chiefly from portraits. All students and teachers of biology will find this a valuable book for reading and reference. M. A. B.

Fish Stories. By C. F. Holder and David Starr Jordan. New York: Holt. 1909. Pp. 336, illustrated. $1.75.

These fish stories are "alleged and experienced with a little natural and unnatural history" thrown in for good measure. Like other authors of similar literature, the authors have no apologies or affidavits to offer; and those who want to know which author tells the best fish story are advised to apply the well-known rules of the Higher Criticism. Space will not permit suitable extracts from these masterpieces of nature-faking; but unwary seekers after nature-study books for schools should be hereby warned that this book has the same relation to nature-study that the "Arabian Nights" have to history. In other words, it is not a satisfactory reference book for use in preparing lessons on fishes; better refer to President Jordan's other books which come at a higher price. But do not forget to take a copy of fish stories when next you go a-fishing.

M. A. B.

Essentials of Botany. By J. Y. Bergen. Boston: Ginn. 1909.

This is somewhat fuller than the deservedly popular "Elements of Botany" by the same author, and seems better adapted to a year's course in high schools, especially in early years, for which the author's "Foundations of Botany" is not well adapted. The first twenty-one chapters are practically the same as in the "Elements." The chapters on cryptogamic plants have been extended, and new chapters present plant breeding, useful plants, and forestry. The most elementary ecology is included; and more attention to this subject would be of doubtful value in most high schools. The book will be welcomed by many who have looked upon the author's "Foundations" and "Principles" as too closely imitating the pure science work in college botany.

M. A. B.

Gray's New Manual of Botany. By Benjamin L. Robison and Merritt L. Fernald, New York: American Book Co. 1908. $2.50.

This seventh edition of Asa Gray's famous manual has been brought to date and into accord with modern views of classification. So completely has it been revised that, at least in parts, the reader scarcely recoginzes resemblance to the sixth (1890) edition. In fact, several critics insist that it is Robison and Fernald's manual, not Gray's.

However, these are matters of historical rather than of practical importance; and suffice it to say that competent botanists praise this new manual as a valuable work. It will undoubtedly win great popularity; but perhaps not so great as did the sixth edition, for the honors must now

be divided with the rival manual by Britton and Brown. The two books are strikingly similar, especially because the new Gray's is so modernized. In fact, one critic has described the new Gray's as essentially "the Harvard edition of Britton and Brown," which means, of course, that it resembles the latter book more than its own previous edition. It is to be hoped that before new editions of either manual appear our botanical friends will have hit upon some stable names for at least a few hundred most common plants. It is disheartening to those of us who are not professional systematists to be forced to remember half-a-dozen synonyms in scientific names of many familiar plants.

Coulter's Nature-Study in Elementary Botany. This is a ten-page addition to the "Practical Nature-Study" referred to on page 200 of the September 1908 number of this magazine. The entire set of about 70 sheets may be obtained from Professor J. G. Coulter, Normal, Ill. Price 58 cts., postpaid.

Birds of the World. By Frank H. Knowlton. Edited by Robert Ridgway. New York: Henry Holt. 1909. Pp. 846, 16 pl., 236 ill. $7.00.

This book will be a valuable reference book for school libraries. While it is mainly a book on classification and descriptions, there are several good introductory chapters including a somewhat technical one on bird anatomy and a very interesting one on the migrations of birds. The main part of the book will be useful for three reasons: First, the division of the families into groups (each corresponding to a genus or to two or more genera), as in the wren family where the groups discussed are headed cactus wrens, rock wrens, canyon wren, carolina wren, bewick's wren, house wren, marsh wrens, European wren, etc., gives units that seem familiar to the most "popular" of readers and must greatly increase the range of readers. Second, the family and group descriptions are most readable, and, what is more important, succeed in giving, in very few words, good pictures of the birds and much matter of real interest concerning the habits, food, nests, etc. Third, this book is probably the only book intelligible to the general reader which contains reliable information about (1) the curious birds in our museums, such as the penguin, snakebird and umbrella bird; or (2) the unusual birds to be found in our zoological gardens, such as the flamingo, toucan, cassowary, and prairie chicken. It will prove even more valuable in verifying or refuting the marvelous tales of our childhood days, for here we find the albatross, the hornbill, the weaver bird, the harpy eagle, and even early illustrations of the dodo.

Teachers College, JEAN BROADHURST.
New York City.

The Boy Geologist. By Edwin J. Houston. Pp. 320. Philadelphia: Henry Altemus Co. A story of the experiences of boys with a taste for geology and chemistry. Readers will unconsciously gain much information concerning physical science.

Syllabus of Lectures on Animal Biology. By W. M. Smallwood. Pp. 166. Syracuse: University Printing Co. 1908. A useful and suggestive outline of a year's course in biology for colleges.

The Sport of Bird-Study. By H. K. Job. Pp. 284, ill. New York: The Outing Publishing Co. 1908. An intensely interesting book showing real sport in hunting birds with field glass and camera in place of a gun.

Kirkes's Handbook of Physiology. By C. W. Greene. Pp. 723, ill. New York: William Wood & Co. 1907. An excellent revision of this famous book which in England has had twenty editions. Designed for advanced students and medical schools.

Studies of Fruit and Nut Bearing Trees. By E. R. Mosher. Pp. 51, 10x14, ill. Syracuse, N. Y. C. W. Bardeen. 1908. Designed as a practical aid to teachers in blackboard decoration, using nature subjects, but expanded into a test for preliminary nature-study. It has numerous correlated quotations from best literature.

Bacteria in Relation to Country Life. By J. G. Lipman. New York: Macmillan Co. 1908. Pp. 486, 69 figs. $1.50. A readable account of the principles of bacteriology applied to rural science. It lacks practical application of principles to many concrete situations which so often demand attention in country life.

Civics and Health. By W. H. Allen. Boston: Ginn & Co. 1909. 411 pp., ill. An excellent interpretation of hygiene from the viewpoint of civics. Deserves thoughtful reading by educators and good citizens in general.

Cornell Rural School Leaflets. Alice G. McCloskey, Editor. Published monthly since Sept., 1907. Valuable for elementary agriculture and especially for agricultural nature-study.

Midland Naturalist. No. 1 published April, 1909, by J. A. Nieuland, University of Notre Dame, Ind. $1.00 per year. Devoted to natural history of the Prairie States.

Long Island Agronomist. An interesting fortnightly record of facts from the experiment station of the Long Island Railroad. Published at Huntington, L. I. Edited by Hal B. and Edith Loring Fullerton, who know how to grow good crops in Long Island sand and also how to write attractive articles for the enlightenment of would-be commuters from the great city adjoining. The leaflets are interesting for students of agricultural problems anywhere within twelve thousand miles of Long Island.

Cornell Home Nature-Study Course. This well-known leaflet, edited by Mrs. Comstock, still continues to help New York State teachers by working out for them the syllabus adopted by the State Dept. of Education. It is to be hoped that the notes will someday be collected and grouped according to allied subjects.

Movable Schools of Agriculture. A plan published as circular 79, Office of Experiment Stations, U. S. Dept. of Agriculture. It proposes sending the instructors to the students—the farmers, their wives and daughters, and the country-school teachers. Several agricultural colleges have tried the idea, but more organization seems useful.

Northern Illinois Nature-Study Leaflets. An interesting series by Professor F. L. Charles, of DeKalb, Ill. normal school. Copies for sale.

Bacteriology in Household. A practical pamphlet in the Sanitation Series of the Cornell Reading Course for Farmers' Wives. Feb., 1909.

Nature Guard. This interesting leaflet of the Nature Guard Bands and Junior League of Improvement Societies of Rhode Island has reached No. 65, Vol. 10, No. 5. Issued from College of Agriculture, Kingston, R. I.

Nevada Mouse Plague. Is the subject of Farmers' Bulletin, 352. Poison, flooding, burning, dogs, hawks and owls, skunks and weasels are the important remedies.

School Gardening and Nature-Study in England. By Susan B. Sipe. Published by U. S. Dept. of Agriculture, Feb., 1909.

Experiments in Agriculture. A series of 100 experiments prepared for California schools by Prof. Riley O. Johnson, of the State Normal School at Chico. The demand has been so great that a second edition has been issued. Price, twenty cents for specimen copy, ten dollars per hundred.

Plant Pets. This is the title of an interesting 30-page article by Prof. F. L. Charles, of DeKalb, Ill., in the Arbor and Bird Day Annual published for 1909 by the State Supt. of Instruction, Springfield, Ill.

Silver Fox. Farmers' Bulletin 328 points out the possibility of a profitable industry in raising these foxes for their valuable skins.

Building a Boy. An account of the boys' gardens at the National Cash Register Factory, Dayton, O. The gardens were established in 1897 and have accomplished wonders with the boys.

Photographing Aquatic Animals. A bulletin of the Bureau of Fisheries describes various methods of photographing aquatic animals in their natural environment. Especially interesting are the methods of using a submerged camera.

Birds of Pacific Coast. A guide to the birds of this region has been prepared by Prof. C. A. Stebbins, and published by the State Normal School at Chico, Cal. Pamphlet, 24 pages.

Alfalfa. A recent Farmers' Bulletin with this title gives valuable information concerning this important plant.

Nature and Science for Young Folks. All the recent issues of St. Nicholas contain articles in the nature-study line which will interest children.

Wood Preservation. An increase in use of creosote from less than four million gallons in 1904 to twenty-five million last year indicates progress in forest conservation. (Press Bulletin of Forest Service.)

Cost of Insects Which Carry Disease. Bulletin 78 of the U.S. Dept. of Agriculture presents the essential facts concerning the relation of mosquitoes to malaria and yellow fever and of the house fly to typhoid.

Wild Horses and Cattle. Certain ranges in the western States are at present seriously infested with wild descendants of domestic cattle and horses, which cause much trouble and loss to stockmen. (Press Bulletin of Forest Service.)

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THE ATTITUDE OF THE NATURE-STUDY TEACHER TOWARD LIFE AND DEATH

By ANNA BOTSFORD COMSTOCK
Cornell University

Perhaps no greater danger besets the pathway of the nature-study teacher than the question involved in her pupils' attitude toward life and death. To inculcate in the child a reverence for life and yet to keep him from becoming mawkish and morbid is truly a difficult problem. It is almost inevitable that the child should become sympathetic with the life of the animal or plant studied, since a true understanding of the life of any creature creates an interest which stimulates a desire to protect this particular creature and make its life less hard. Many times within my own experience have I known boys who began by robbing birds' nests for egg collections to end by becoming most zealous protectors of the birds. The humane instinct within these boys budded and blossomed in the growing knowledge of the lives of the birds. At Cornell University it is a well-known fact that those students who turn aside so as not to crush the ant, caterpillar or cricket on the pavement are almost invariably those who are studying entomology; and in America it is the botanists themselves who are leading the crusade for flower protection.

Thus the nature-study teacher, if she does her work well, is a sure aid in inculcating a respect for the rights of all living beings to their own lives, and she needs only to lend her influence gently in this direction to change carelessness to thoughtfulness and cruelty to kindness. But with this impetus toward a reverence for life, the teacher soon finds herself in a dilemma from which

there is no logical way out so long as she lives in a world where lamb chop, beefsteak and roast chicken are articles of ordinary diet,—a world in fact where every meal is based upon the death of some creature. For if she places much emphasis upon the sacredness of life, the children soon begin to question whether it be right to slay the lamb or the chicken for their own food. It would seem that there is nothing for the consistent nature-study teacher to do but become a vegetarian, and even then there might arise refinements in this question of taking life, and she may have to consider the cruelty to asparagus in cutting it off in its plump infancy or the ethics of devouring in the turnip the food laid up by the mother plant to perfect her seed. In fact, a most rigorous diet would be forced upon the teacher who would refuse to sustain her own existence at the cost of life; and if she should attempt to teach the righteousness of such a diet, she would undoubtedly forfeit her position, and yet what is she to do! She will soon find herself in the position of a certain lady who placed sheets of sticky fly paper around her kitchen to rid her house of flies, and then in mental anguish picked off the buzzing, struggling victims and sought to clean their too adhesive wings and legs.

In fact, drawing the line between what to kill and what to let live, requires the use of common sense rather than logic. First of all, the nature-study teacher while exemplifying and encouraging the humane attitude toward the lower creatures and repressing cruelty which wantomly causes suffering should never magnify the terrors of death. Death is as natural as life and the inevitable end of physical life on our globe. Therefore, every story and every sentiment expressed which makes the child feel that death is terrible is wholly wrong. The one right way to teach about death is not to emphasize it one way or another, but to deal with it as a circumstance common to all; it should be no more emphasized than the fact that the creature ate, or fell asleep. David Starr Jordan deals with this subject in all his children's stories in an ideal manner. In his story of a salmon he states: "Then there were many more little salmon with him, some larger and some smaller, but they all had a very merry time. Those who had been born soonest and had grown largest used to chase the others around and bite off their tails, or still better, take them by the heads and swallow them whole; 'for,'

said they, 'even young salmon are good eating.' 'Heads I win, tails you lose' was their motto. Thus, what was once two small salmon became united into a single large one and the process of addition, division and silence still went on." And in another admirable story President Jordan says: "So this little Medusa floated around and opened and shut her umbrella for a long time, a month or two perhaps, we don't know how long. Then when morning came, down among the seaweeds, she laid a whole lot of tiny eggs, transparent as crabapple jelly, and smaller than a dew drop on the end of a pine leaf. That was the last thing she did; so she died and our story henceforth concerns only one of those little eggs."

Another thing for the nature-study teacher to do is to direct the interest of the child so that it shall center upon the hungry creature rather than upon the one which is made into the meal. It is well to emphasize the fact that one of the conditions imposed upon every living being in the woods and fields is that it is entitled to a meal when it is hungry if it is clever enough to get it. The child naturally takes this view of it. I remember well as a child I never thought particularly about the mouse which my cat was eating; in fact the process of transmuting mouse into cat seemed altogether proper, but when the cat played with the mouse that was quite another thing, and was never permitted. Although no one appreciates more deeply than I the debt which we owe to Thompson Seton and writers of his kind who have placed before the public the animal story from the animal point of view and thus set us all to thinking, yet it is certainly wrong to impress this view too strongly upon the young and sensitive child. In fact, this process should not begin until the judgment and the understanding is well developed, for we all know that although seeing the other fellow's standpoint is a source of strength and breadth of mind, yet living the other fellow's life is, at best, an enfeebling process and a futile use of energy.

It is probably within the proper scope of the nature-study teacher to place emphasis upon the domain of man, who being the most powerful of all animals, asserts his will as to which one shall live in his midst. From a standpoint of abstract justice the stray cat has just as much right to kill and eat the robin which builds on my porch as the robin has to pull and eat the earthworms from my lawn, but the place is mine, and I choose to kill

the cat and preserve the robin. Also when emphasizing the domain of man we may deal with the killing of creatures which are more or less injurious to his interests. Nature-study may be tributary to this, in a measure, but it is surely not nature-study; for example, the child studies the cabbage butterfly in all its stages, the exquisitely sculptured yellow egg, the velvety green caterpillar, the chrysalis with its protecting colors, the white-winged butterfly, and becomes interested in the life of the insect. Not under any consideration when the attention of the child is focused on the insect should we suggest a remedy for this insect as a pest. Let the life-story of the butterfly stand as a fascinating page of nature's book. But later when the child enters on his career as a gardener, when he sets out his row of cabbage plants and waters them and cultivates the soil and does his best to bring them to maturity, along comes the butterfly, now an arch enemy, and begins to rear her progeny on the product of his toil. Now the child's interest is focused on the cabbage and the question is not one of killing insects so much as of saving the plants. In fact, there is nothing in spraying the plants with Paris green which suggests cruelty to innocent caterpillars nor will the process harden the child's sensibilities.

The matter of museum specimens is another question for the nature-study teacher to solve and has a direct bearing on the subject of life. There are many who honestly believe the stuffed bird or the case of pinned insects have no place in nature-study, and certainly these should not be the chief means of study. But again, let us use our common sense; the boy sees a bird in the wood or field and does not know its name; he seeks the bird in the museum and thus is able to place it and read about it and is stimulated to make further observations concerning it. Wherever the museum is a help to the study of life in the field then it is well and good. Again, there is no question but that making a collection of insects is a most efficient way of developing the child's powers of close observation as well as giving him a manual dexterity in handling fragile things. Also it is a false sentiment that attributes to an insect the same suffering at being impaled on a pin that we might suffer at being thrust through by a stake. The insect nervous system is far more conveniently arranged for such an ordeal than ours, and, moreover, the cyanide bottle brings immediate and painless death to the

insects placed within it, and too, the insects usually collected have short lives anyway. So far as the child is concerned he is thinking of his collection of moths or butterflies and not at all of taking life, so it is not teaching him to destroy wantonly living creatures. However, an indiscriminate encouragement of the making of insect collections cannot be advised. There are some children who will profit by it and some who will not, and unquestionably the best kind of study of insects is watching their interesting ways.

To kill a creature in order to prepare it for a nature-study lesson is not only wrong but absurd, for nature-study has to do with life rather than death, and the form of any creature is interesting only when its adaptations for life are studied. But again a nature-study teacher may be an opportunist; if without any volition of pupils or teachers a freshly killed specimen comes to hand she should make the most of it. The writer remembers most illuminating lessons from a partridge that broke a window and its neck simultaneously during its flight one winter night; a yellow hammer that killed itself against an electric wire, and a muskrat that turned its toes to the skies for no understandable reason; in each of these cases the creature's special physical adaptations for living its own peculiar life were studied, and the effect was not the study of a dead thing but of a successful and wonderful life.

A NEGLECTED SIDE OF NATURE-STUDY

By R. C. PECK
Normal School, Huntington, W. Va.

It has always seemed to me that correct notions about the great principles which underlie all those applications of science which make our modern civilization possible ought to be a part of the heritage of every boy and girl of the twentieth century. With the great majority of children leaving school before they finish the grammar grades, the only opportunity for this seems to be in the nature-study work.

The importance of this sort of thing—physical nature-study it might be called—seems to be generally recognized. Professor McMurry in his "Special Method In Elementary Science" gives it considerable space in his Outline of Nature-Study and the editor

of THE NATURE-STUDY REVIEW has more than once intimated that the journal was not for the discussion of biological lessons alone; but all the illustrative lessons actually worked out by Professor McMurry are of the biological sort and the writer has searched in vain for any articles in THE REVIEW dealing with the problem of elementary physical science in the grammar school.

Some time ago the editor of this journal sent out a general invitation to teachers to send in reports of work actually done along nature-study lines. For over a year the writer has been experimenting surreptitiously with a so-called geography class made up of a rather heterogeneous group of eighth-grade pupils in grammar school and first-year students in high school, and teachers from country schools who were with us for a term or two. Lessons illustrated with very inexpensive apparatus have been given, choosing such subjects as the way to fight fire, how we keep warm, the "why" of the kitchen pump, and the compass needle. In some cases those with experience in teaching have presented a lesson to the rest of the class.

So far as we have been able to observe the results have been very gratifying, as shown by subsequent work both in the physical geography and physiology and in the regular chemistry and physics classes. One enterprising young man has been giving lectures illustrated with home-made apparatus to teachers' institutes. During the past year, one young woman who has had our regular physics course has been giving weekly lessons on air-pressure to her class in one of the intermediate grades, beginning with the bottle which cannot be filled with ink if the funnel fits the mouth too tightly and ending with the barometer. She reports an interest on the part of the children which has made the work delightful. With the exception of the barometer, a glass model of a pump and a glass funnel, the outlay has been practically nothing, the materials being such as can be had for nothing or borrowed from the homes of the children.

I am inclined to think that such lessons offer some advantage over those of a biological nature. Something happens, and that always appeals to the heart of a child. Moreover, it is possible for the whole class to see what happens and to see it at once. In proving that water evaporates faster from sand than from loam, the pupils must take the teacher's word for it, if he proves that a tumbler of wet sand loses weight faster than one of wet loam, and

in proving that sprouting beans give off carbonic acid gas it is very difficult for each one to see for himself that the lime water in the glass vessel with the beans really is milky. If, on the other hand, a teacher giving a lesson on fighting fire, sets fire to a small pan of gasoline, and then slips a cover tightly over the edge, the child sees at once what smothering a fire means.

One object of education is to open our eyes to the things about us. A study of trees or birds opens up a whole world of enjoyment which ever surrounds the country or village child. There is a like wealth of culture and enjoyment in the electric wires, the motor cars, and the constant building operations which surround the city child, if he only learns to take an intelligent interest in them.

Lessons of this sort, moreover, offer an excellent opportunity for training the reasoning powers. A magnetized knitting needle is suspended by a thread, a little flag of bright red paper at one end and a green one at the other. It slowly swings till it points to the north. Another one exactly similar is brought near. What happens when the green flags are together? What when the red flags approach? What is the rule we have discovered? Here is a bar magnet. Which end of this magnet is a north pole? Decide from the behavior of the needle. Has this horseshoe magnet two kinds of poles? Each time there is a chance for thought, discussion, and then a truly scientific settling of the question by an actual experiment which every one can see. If we should cut one needle in two would each piece still have two poles? Try it. Suppose we keep on cutting it. An ordinary wire cutter maker this easy. Take a fresh needle and stroke one way with the north pole of our magnet. Which will be the north pole of our new magnet? Why do compass needles point north? What sort of a pole is there in the Arctic regions? What makes masses of iron ore sometimes magnetic? Why does the bit used in drilling oil wells often become a magnet? Why does it cease to be one when heated in retempering it? Try heating our knitting needle in the gas flame.

Does all this belong only to the handful who take physics in the high school?

NATURE-STUDY IN PRIMARY GRADES

By S. SILCOX
Stratford Normal School, Canada

The aims of nature-study work in primary grades should be to interest children in animal and vegetable life; to help interpret nature literature; to teach the value of life and to arouse right action towards it. It is most important that children should know what life should be destroyed or held in check as well as to know what life to foster.

The principles which should be observed are that children cannot study any object intensively, that habits and use should precede structure and adaptation; that active personal experience is the basis of effective interest; and that work should be related to every day life.

The most pitiful effort in education is the attempt to teach young children the detailed structure of plants and animals. When the senses alone are relied upon, it is not so bad, but when the teacher insists upon explaining to children of tender age phenomena that cannot be fully understood by children under twelve years of age, one feels that the curriculum of the good old days saved us from something.

There are many things which require many years to learn and which form the basis of classification, so essential in science. To introduce this work prematurely is to waste time now and to develop antipathy towards the subject for all time. Let us leave science for the high school period and in primary grades devote ourselves to the development of a sympathetic attitude towards life around us.

The best way to make one's meaning clear is to take a class and actually teach a lesson on the subject under discussion. The next best way is to tell how an actual lesson was taught. This I propose to do. Before doing so let me say that no two lessons on nature-study should be exactly alike. In fact, if I were teaching ten or twenty lessons to a class, I should endeavor to make each different from the other, always bearing in mind that the aims are the same in each.

Subject of Lesson—The Crow.

Class—Boys and girls about 8 years of age.

Material used—Crow's nest, picture of crow, Thompson-Seton's *Silverspot.*

Class was asked for show of hands of owners of pet crows; then of those who knew the pet crow of any other boy or girl. Those who had had pet crow's were asked to tell about them. By questioning, the boys told where they got the crows, when, where they kept them, what they ate and did. The teacher added his own experience with pet crows. The boys who knew about other pet crows told what they knew. As we were not in search of facts, very few facts were placed on the blackboard. The food of the crow was stated,—worms, bread (soaked), soft corn, grapes, grasshoppers. The class was asked to find out from their parents or from books anything else the crow eats and to report next day and on following days.

Now, the pupils were reminded of wild crows, and their knowledge of them was revived by asking such questions as, When did you see crows last? Where? How many were there? What were they doing? What do farmers put up to scare crows? Where do they put it? Why do they not catch the crows or shoot them? This leads to the way the crow protects itself. They go in flocks, they see well, and, apparently smell a gun at some distance. A drawing of the scare-crow was made on the board and its value touched on. After all this discussion, we summed up: The crow takes care of itself by watching for enemies, by placing sentinels to watch and by flying away as soon as danger is near. Asked how the sentinel warns the others of danger, the pupils said by 'cawing.' Do they caw in different ways?

The pupils were told that Thompson-Seton wrote a story about a flock of crows and their leader, "Silverspot." The teacher showed the picture of Silverspot and read the description of how "Silverspot" warned the band. The musical notes were written on the board and the pupils tried saying them as old "Silverspot" said them. The story was left to be finished later during the hour for supplementary reading. We read how "Silverspot" trained the young crows of his flock, and this served to introduce the home of the young crows before they fly. The pupils were shown the nest and asked to observe what it was made of—sticks, bark, grass. A picture of crows in a nest was shown; and we discussed where the nest was built, how, what is put into it by the mother-bird (eggs), how she sits on the eggs to make the little ones grow inside the shells.

There is no need of teaching the number of eggs laid, the color of them, the exact time of incubation, etc. Nor should the number of toes that the crow has, its eyes, nose, ears, be particularly emphasized. When talking about the crows eating corn in the cornfield, the question of how it gets the corn out may come up. Then the bill and the feet may be examined to see what could be done with them. When talking about sentinels, the

eyes, in the side of the head, or the ears, might be examined. But all these points of structure should be made of secondary importance to the habits and use of the crow.

One of the boys in the class to which the above lesson was taught, volunteered the statement that he liked that lesson and wanted to know the name of the book in which the story was to be found. It was agreed by the student-teachers present that the first two aims, i. e. to interest children in animal life and to help interpret literature, had been accomplished and that a beginning had been made towards the accomplishment of the last two, i. e. to teach the value of the crow and to secure right action towards it.

After consideration and discussion, the following list of subjects, with related literature in some cases, was made as being suitable for children of the first two or three grades of the public schools.

Cat—"The King of the Park," Marshall Saunders.
Dog—"Beautiful Joe," Marshall Saunders.
Sparrow—
Chickadee—
Horse—"Black Beauty," Anna Sewell,
Owl—"Hushwing," Chas. G. D. Roberts.
Rabbit—""Raggylug," Thompson-Seton.
Robin—"Master Chupes and Miss Jenny," Bignell.
Spider—"Stories—e. g. Bruce and the Spider."
Bear—"Heart of the Ancient Wood," Roberts.
Eskimo—"Children of the Cold," Schwatka.
Indian—"Hiawatha," Adapted.
Wolf—"Stories of Pioneer Life."

Any pet that can be brought to school would be quite suitable —raccoon, white rat, canary, parrot.

Some plants could be treated under the headings suggested in former numbers of THE REVIEW, but the specimens studied should be limited to (1) plants that children have grown, e. g., nasturtium, candytuft, tulip, geranium, (2) plants of fields and woods, whose habitat is familiar to the children. In these cases, no literature is necessary, except accounts of children's experiences with plants. The habit of personifying plants for nature-study purposes is objectionable.

In conclusion, if any teachers of animal life have been distressed of late regarding the value of stories by Thompson-

Seton, W. J. Long, Roberts, and others because of criticisms from men who speak from the standpoint of the hunter of animals, not from the standpoint of the sympathizer with animal life, let them rest assured that neither fact nor fiction is the aim in nature-study, but sympathy for all that is good in life.

CORRELATION BETWEEN NATURE-STUDY AND HIGH SCHOOL BIOLOGY

By GEORGE W. HUNTER
DeWitt Clinton High School, New York City

[Abstract of paper presented at the Baltimore meeting of the American Nature-Study Society.]

EDITOR'S NOTE.—The report which follows may well serve as a basis for the first work of the committee on relation of nature-study and high-school biology. The fact that such a small percentage of high schools attempt correlation may be surprising to many readers; but it must not be taken as a criticism on nature-study more than on high-school biology. Both are still in early embryonic stages. Also it must be remembered in all such discussions that the early biological work of high school is commonly nothing more or less than nature-study, hence correlation is apparently absent. The editor doubts whether we can safely draw conclusions from the past and believes the record which follows has significance chiefly with reference to problems for future solution.

During the Spring of 1908, the writer, wishing to obtain some first-hand information relative to the condition of the teaching of biologic science in the secondary schools of this country, sent out to the leading high schools in the cities and larger towns in the United States a questionnaire on the method, purpose and content of biologic science in the high school. This questionnaire went for the most part to cities of 10,000 inhabitants and over. The answers received may be said to fairly well represent the actual conditions in city and urban high schools the country over. The county or township highschools sent answers in the proportion of 5 to about 300 answers received, so may be considered a negligable factor in the following report:

The basis for this paper was obtained from the answers given to the following question. "Assuming that you have nature-study in the grades, to what extent do you correlate the grade work in nature-study and human physiology with the biology of the high school?"

The answers received were grouped under the headings New England, Middle, Southern, North Central, Rocky Mountain and Pacific States* (see foot-note.) One hundred and seventy-eight schools, representing thirty states reported on this question. Of these schools, 110 reported no correlation whatever between the nature work of the grades and the high school, 47 report slight correlation and 19 schools, several of which are private institutions having a continuous course from elementary to high school, report rather complete correlation.

The following figures show graphically the states reporting by groups:

	Correlation	Slight	None
New England	3	8	22
Middle	5	15	31
Southern		3	2
North Central	11	17	50
Rocky Mountain		4	4
Pacific		2	1
	19	49	110

Of the schools reporting complete correlation, three each are from Massachusetts and New York; two each from Indiana, Iowa Michigan and Wisconsin; while Illinois, Missouri, Ohio, New Jersey and Pennsylvania report one school each.

The above figures show that less than 11% of the schools reporting assume correlation to the extent of basing the high-school science, especially biologic science, upon the foundation laid down by the nature-study of the elementary school.

If we believe that correlation of a general nature ought to exist, and most of us do believe this, then this report is not of an

*This grouping was used by J. Q. Brown in an article entitled "Laboratory Equipment in Secondary Schools." School Science and Mathematics Nov., 1908. The states included in the above grouping are: (1) New England: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut; (2) Middle States: New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia; (3) Southern States: Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Arkansas, Oklahoma, Indian Territory; (4) North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri; (5) Rocky Mountain: North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Idaho; (6) Pacific: Washington, Oregon, California.

extremely encouraging nature. The nature-study movement is still young, but should not better results be attained than these figures seem to warrant? And since this lack of correlation does exist, what are the reasons for its existence from the high-school teachers point of view?

Reasons why the correlation is not undertaken or when undertaken, is not successful?

The following answers will serve to show the factors which mitigate against successful correlation:

"Work in the grades is not uniform, therefore no correlation." This is a rather frequent reason given. Boston high schools report that "the nature work in the various schools feeding our high schools is so various that we cannot correlate." A St. Louis school says, "Nature-study is so unequally developed, depending upon the training and preference of grammar-school principals and teachers that we cannot depend upon anything definite." A New York high-school teacher writes, "the nature-study differs so much in the various schools that it is almost useless for building material." From Missouri, Ohio, Michigan, New York, New Jersey and several other States is the cry of lack of uniformity in the nature-study work.

Another objection, closely allied to the above objection to nature-study as now given is lack of system and of organization of material. Massachusetts, Michigan, Missouri and Ohio all join in this protest.

A third comment is upon the method of presentation. Numerous schools say that the nature-study consists largely of reading or "book work." To such preliminary work the science teacher, naturally enough, can give little attention.

Another valid objection, and a rather universal one, is that some schools feeding a given high-school may give the work while others may do absolutely nothing with nature-study. This may be due to the lack of departmental work in the elementary schools or individual preferences of teachers, some of whom, by training or temperment do not make good teachers of nature-study.

One rather surprising statement, repeated by several high-school teachers in various States is, "that very little of the nature work appears to be retained, forming a slight basis for science work." This surely inveighs against methods of presentation

rather than the material worked with or upon, the subject-matter or the pupils.

Two or three other statements taken at random, will throw some light upon one or two other factors in this correlation problem. "The two lines are so utterly divergent in manner of presentation that no attempt is made to make connection." "The nature work is still in an experimental stage. It is not to be depended upon as all pupils do not get it." "It is not sufficiently developed to be of use."

In some towns the nature work is actually being eliminated, so unsatisfactory are conditions. Malden, Mass., reports, "Nature-study in the grades has been given up." Minneapolis writes, "The nature work is not correlated. We try to avoid the topics that may have been presented in the grades." This answer applies to conditions in some New York city schools as well. An Ohio town reports that "there is no correlation and nature-study is being eliminated."

Teachers of science appear to be very sure that nature work, properly directed and organized, would be of immense value to the pupil who continues science work in the high school. Especially is this true of elementary physiology, which although not strictly nature-study, might be made much more useful if it could be in some manner correlated with the nature work. The following quotations serve to illustrate the feeling in this regard. "No doubt the nature work aids the pupil in his science work." "If properly taught, nature-study would greatly aid our students in their science work." "The nature work does not aid us greatly. The human physiology is of greater advantage to the pupil in his biological work in the high school."

Let us now turn to the answers from schools which report correlation in order to see in what this correlation consists and to what extent it is carried out. Worcester, Mass., reports, "Nature study is used as a foundation for the science work which follows." New Bedford, Mass., "We make the grade work the starting point and human physiology the goal". Sault St. Marie, Mich., "Grade work is the basis, we build on it a continuous higher course". Concord, N. H., "We try to place and arrange scientifically the knowledge already acquired". Several New York schools, two of them of the nature of large private schools report "the work in the elementary school is the foundation on which

we build our high-school science". "Nature-study is an introduction to science." A western city says, "Nearly all our elementary teachers have had courses in biology and carry out the same methods of instruction (experimental method) in grades as in the high school."

Personal experience in New York City, where the correlation in most schools is very slight, shows that pupils who have had experimental science as is given in some of the elementary schools of the city (where a special teacher gives instruction under the departmental system) come to their biological work with an entirely different mental attitude from pupils who have not had this training. In such pupils the habit of scientific thinking is already forming.

It is not the purpose of this paper to suggest methods of improvement in nature-study, but some very evident lines of advancement are open, if this report means anything. Expression of opinion has been freely given, and some of the criticism obtained is just. The past decade has shown great strides in the direction of the introduction of nature-study in the schools, the obvious suggestion arising from the data just given would indicate that the teachers of nature-study should next attack the problems of subject-matter and point of view. More uniformity of subject-matter and more uniformity in presentation; less time devoted to reading or teaching about nature and more time given to experimental work of a simple sort; the correlation of nature work and elementary physiology; the introduction of cyclic work of a kind that will have ultimate bearing on the problems of life; and last but not least, the proper training in the normal schools for the *teaching* of nature-study—these are some of the problems to which the leaders of the nature-study movement might well devote their energies during the next decade of nature-study development in the elementary schools.

THE RELATIONS OF BOTANY AND NATURE-STUDY

By WILLARD N. CLUTE
Editor of American Botanist

Pupils who have had nature-study in the grades are finding their way into the science classes in the high school in constantly increasing numbers and the occasional familiarity they show with various phases of plant life inclines the teacher of botany to ask whether it is possible for him to assume a working knowledge of certain plant phenomena in all such pupils, which he can, in consequence, eliminate from his own courses, or whether he must take nothing for granted and begin at the beginning just as if nature-study had never been discovered. I am well aware that nature-study makes no claim to fitting its students for any special class in science, but it seems to me that in so far as this study relates to botany, the advantages to be derived from such fitting, if it can be accomplished without essential change in the subject-matter, is great enough to make the attempt worth while. If we are to have studies of plants at all in the grades below the high school, it would seem as if these studies ought to be of advantage to the pupil in his later work, but in order to secure him this advantage some sort of an agreement will be necessary as to the main topics to be taught and all the pupils in the schools tributary to any certain high school will have to become familiar with approximately the same body of facts. It will not do for the eighth grade in one school to study seeds and seedlings, while that in another is wasting its time on photosynthesis.

The unifying of the subject-matter would seem to work good rather than harm. Its chief effect would be to eliminate from some courses the showy things of botany upon which some teachers depend for arousing a factitious interest in nature-study and in their places to emphasize the fundamentals of both botany and the nature-study of plants. At present, pupils who have had a few of these showy experiments, and perhaps peeped at an occasional specimen through a compound microscope, are inclined to feel that there is nothing more in the study of plants for them and so avoid the real botany of high school and college. Or, if they really have had a pretty thorough excursion into the realm of botany by the nature-study route, they will be obliged

to traverse much ground already covered should they take up this study in high school. That nature-study has not entirely found itself as to subject-matter, I judge from a recent text-book wherein are suggested for pupils under high-school age such topics as starch translocation, photosynthesis, respiration, transpiration, digestion, stomata, chloroplasts, fibro-vascular bundles, root-hairs, bacteria, etc. Many of these must of necessity be studied by means of the compound microscope and to my way of thinking are subjects with which pure botany and not nature-study is concerned. They are not nature-study topics, for they are parts of nature in which the student has no real or abiding interest. The selection of such topics is but another instance of the error all of us make in concluding that the proper course for any grade may be made by diluting the course of the grade next higher. The high school too frequently has an imitation college course in botany, and it will require rare self-restraint upon the part of the elementary schools if a dilute course in high-school botany is to be avoided.

We are to apt to conlcude that a knowledge of a certain set of facts is essential to the proper educational development of the child. As I see it, the only essential thing about nature-study is to follow up and develop the child's interest in nature, if he shows any, and to awaken such interest if possible, if he does not. Most children early give indications of their line of interest. Their first questions are naturally about the earth, the animals and the plants and such interest usually lasts through life. There is scarcely a person that is not interested in the names of things; too often this is the only interest they ever manifest. Here, then, is a fine place to begin any course in nature-study, but we must not assume that because the child is interested in the larger aspects of nature, that he is equally interested in the minute things. If we can induce him to question further about the use of things and how form has contributed to function we would seem to have nearly solved the problem. Happily, information upon the points in which the child is interested, is the information that the teacher of botany would most prefer to have in the heads of his pupils. Beginning botany students are surprisingly ignorant of the appearance of our common food plants when growing, and even country children can call very few of our wild plants by name. For the botany teacher's purposes, the more students

know about plants as complete individuals, how, when and where they grow, how they are pollinated, how the seeds are distributed and what special methods plants have for getting on in the world, the better it will be. Mere technical names such as ovate, serrate, palmate, lanceolate, excurrent,deliquescent, hypogynous, polypetalous, etc., with which the infant memory is too often crowded, are not at all desirable. They are but left-overs from the long ago when botany consisted chiefly in analyzing flowers. If names are to be taught let them be such terms as blade, petiole, stipules, wood, bark, pitch, sap-wood, heart-wood, cotyledon, caulicle, plumule, sepal, petal, stamen, carpel, pollen, ovule and such others as they are likely to have use for throughout life whether they take botany or not. And when these are learned, let the pupil compare the parts of the plant which they represent with similar parts of other plants, noting differences of form and function. Then, indeed, will the botany teacher rejoice and sing the praises of nature-study forever.

INFLUENCE OF ENVIRONMENT ON NATURE-STUDY

By JOHN L. RANDALL

Science Dept., Normal School, California, Pa.

[Notes on discussion at Baltimore meeting of A. N. S. S.]

The NATURE-STUDY REVIEW has already published lengthy discussions on the confines and limits of this subject; a subject that within the domains of natural science has no other boundary than the child's environment. The phase of the subject to be taken up should depend very largely on the environment. That is, the teacher, or those preparing teachers for the country school, should place greatest emphasis on elementary agriculture, while the city teacher will have other subjects near at hand that will be more vital to the child.

My own experience in one of the greatest industrial regions of the world, the Monongahela River Valley, Pa., leads me to believe that some very good nature work may be done there, using physical science as the basis.

The people of Western Pennsylvania deal not with agriculture principally, but with coal mining and steel manufacturing, so that the most interesting nature-study to the child of this region can be taken from "Simple Machines" of physics. To illustrate, a class from the sixth grade of our training school, named over one

hundred simple machines in and about coal mines, and seemed much more interested in the application of pulleys, levers, and inclined planes, than in plants or animals.

I am disposed to criticise the fraternity of normal school teachers in that we teach what we learned in college, rather than look over the field that our students are to work in and then instil into them the things environing the child.

I believe this should be done so thoroughly that no normal school graduate will ever try to teach physical laws, or begin animal nature-study with "Natural Selection." Teach them to begin with objects rather than principles and take those objects from the door yard, not from the South Sea Islands.

NATURE-STUDY AND PHYSIOLOGY

By ALVIN DAVISON
Lafayette College, Easton, Pa.

[Abstract of remarks at A. N. S. S., meeting.]

Nature-study has been tried in many schools and a considerable number of them have dropped it because it seemed to have but little practical value. It is refused a place in many school programs because the number of studies is already too great and the matter presented as nature-study has been of such a character as to have but little influence on human welfare. If general nature-study is to become a part of the elementary school work in the majority of schools, it must be allied with the specific nature-study, physiology, now taught in nearly all schools of the lower grades. A considerable portion of the large amount of time required by law to be devoted to physiology could very profitably be given to a study of the food of birds and insects, to the inter-relation of plant and animal life, and to the character of molds, yeasts and bacteria as they affect human life. The subject of clothing and health gives opportunity to consider how air and soil by means of the mulberry tree and silk-worm may be transformed into silk, and how the same inanimate materials by means of the cotton plant may be changed into cotton clothing. The study of the life-histories of the bugs, flies and mosquitoes so intimately related to health has an enduring interest for the young and is of high educational value, while at the same time it is an important part of the subject of modern hygiene. In many other ways a large amount of nature-study can be linked with physiology.

FORESTRY FOR SCHOOLS

By E. A. SANDERS
Teacher of Botany, Steele High School, Dayton, O.

This topic of national importance offers some peculiar advantages as a subject for a practical botany course in that it is new in both city and country, interests all classes, acquaints the boy with the principals of a new and uncrowded profession if he cares to follow it further and in any case gives him scientific manual training for good citizenship.

To test the above theory a class of boys was organized in the fall of 1908 at Steele High School, Dayton, O. The results, in the opinion of the author, fully justified the experiment and demonstrated the value of the work.

The class included boys from both city and country, the studious type and the careless athletic-loving type, all of whom with one exception were deeply interested and thoro-going in their work. Two of the boys are definitely looking forward to forestry as a profession and all have shown an awakened interest in the conservation of our forests and waterways.

The work usually consisted of two lectures, two field trips and one written or oral test per week. Laboratory work on wood structure and physical properties was introduced after Christmas and symposium reports on assigned topics occupied some attention. Lecture, laboratory and test periods were of 45 minutes each and field trips after school of two to three hours. The greatest defects were, lack of complete organization of the course and inability of all students to be present at all field trips. I append below a syllabus of the topics taken up.

Syllabus of Forestry Course

A. Identification of trees (70 species).....4 weeks
Field and lecture work. Leaf keys and collections.
References.—Kellerman, Apgar, Hough.

B. Identification of woody vines and shrubs.....1 week
A study of undergrowth and forest cover.
References.—Schaffner, Keeler.

C. Forest Ecology.....4 weeks
A study of collections of trees. Effect of environment on forest types. Type maps, Plant Societies.
References.—Graves, Schimfer, Schenk.

D. History of Forestry ..... 1 week
Lectures on European and American forestry.
References.—Graves, Cir. 140, Forest Service U. S. A.

E. Silviculture ..... 3 weeks
Establishment and care of forests. Tree planting and Regeneration, Enemies of forests. Working plans.
References.—Schenk.

F. Mensuration ..... 3 weeks
Calculation of stands and values. Pacing, mapping, surveying, estimating. Field work. Maps.
References.—Bulletins 20 and 36. Forest Service, U. S. A.

G. Lumbering ..... 2 weeks
History and present supplies. Conservation, Forestry methods. Visits to mills, Identification of woods. Bulletin 34.

H. Laboratory Work ..... 2 weeks
Microscopic structure and physical properties. Bulletin 10.
(Each student presents a thoro investigation of one tree as a thesis.)

AMERICAN NATURE-STUDY SOCIETY

The attention of members is respectfully called to the following which in circular form is being distributed. Your cooperation in the campaign for new members is needed.

This Society was organized in January, 1908. Its purposes, as stated in the constitution, are: (1) to promote critical and constructive investigation of all phases of scientific nature-study (as distinguished from technical science) in schools, especially all scientific studies of nature in elementary schools; and (2) to work for the establishment in schools of such nature-study as has been demonstrated valuable and practicable for elementary education.

It should be noted that the term nature-study as quoted above from the official transactions of the society stands for all that is best in scientific studies of natural objects and processes, in elementary schools especially; and accordingly the interests and activities of the Society include biological nature-study of plants and animals, physical nature-study of lifeless things (often called "elementary science"), study of the human body ("physiology and hygiene"), school-gardening and elementary agriculture, and the observational phase of geography. These are not to be regarded as so many diverse and antagonistic subjects, for as now best taught there runs through all a strong bond of union, which is simply the nature-study idea.

The Society welcomes to its membership teachers and others who are interested in nature-study (in the best and widest sense) for schools. The first directory of members was published in March 1909. The annual membership fee is one dollar, payable before February 1, or upon election to membership in case of new members.

The constitution provides for an official journal, THE NATURE-STUDY REVIEW, and the annual subscription price ($1.00) of this journal is included in the membership fee of the Society ($1.00).

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The Society can work most economically and efficiently through publications, and for convenience in keeping complete sets as well as economy in printing and mailing these are issued in the official journal. It is therefore important that the Society should be able to increase the circulation of this journal and to use extra copies freely in extending the work. For this purpose of publications there is needed at least $1000 per year which means 1250 members' fees, reserving 20% for necessary expenses of the Society not included in publications. The present membership does not yield this income and unless a great increase can be made this year the work of the Society must be hampered by necessary reduction of the editions of the official journal to the minimum of copies required for members and other subscribers, and also by publishing four or five instead of nine numbers annually. That this would be a misfortune is the opinion of more than one

hundred well-known educators and men of science who have voluntarily written that the official journal is a most important medium for communication between educators working with the elementary phases of science instruction.

There is a widespread impression that THE NATURE-STUDY REVIEW is merely a private enterprise. This was originally and still is legally the case, because in order to keep it going the editor has been forced to meet a deficit of several hundred dollars (average $400) per year. No other individual or institution has aided more than with three subscriptions at $1.00 each per year. This private responsibility has been continued since January 1908 in the interests of the American Nature-Study Society, but must be withdrawn after December of this year. It is therefore necessary that at once an attempt be made to strengthen the finances of the Society so that the official journal for 1910 may be issued on the full financial responsibility of the Society, and under the control of an editor or a board of editors to be elected.

Date .....

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THE
NATURE-STUDY REVIEW

DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

VOL. 5 SEPTEMBER, 1909 NO. 6

NATURE-STUDY PAPERS FROM SOUTHERN STATES

Six papers in this issue by writers living and working in Southern States have been collected by Professor F. L. Stevens, of the North Carolina College of Agriculture and Mechanic Arts. In addition to these papers, the following have been held for a special issue to be devoted to school-gardens: "School-gardens in Louisville, Ky.," by Emilie Yunker of the Louisville Normal School; and "School Gardens in Elizabeth City County, Va.", by Ellen Guy Lindsay.

NATURE-STUDY IN THE SCHOOLS

By W. J. McCONATHY
Louisville, Ky.

Whatever the school presents to its pupils constitutes the educational environment through which it attempts to exercise the mental and physical activities of the child. Ordinarily, the school offers an environment consisting of a room, containing merely some desks, a blackboard, a teacher, some books, slates or paper and some pupils. Sometimes a few pictures are added for æsthetic purposes. Very little attempt is made to exercise and train any of the senses. The eye is used only to see the letters in the book, and the ear to hear only the voice of the teacher. The crude images the child has gathered for itself outside of the school are relied upon to enable it to interpret the images presented by the books. Consequently so much of the so-called reading becomes a mere calling of words.

Fortunately, some schools have greatly improved these conditions by inaugurating a system of window gardens, yard-gardens, out-door trips to parks, rivers, quarries and farms. In connection with these trips, they have made collections of objects illus-

trative of most of the features of a natural human environment. These advanced schools are gradually preparing a school environment adapted to exercise the perceptive nerves, the associative fibres and the powers of comparison and judgment. They are leading the way to the true cultivation of the whole nervous system, and bringing to its aid those muscular activities so necessary to a proper investigation of the field of nature-study. The office of the teacher is to guide the pupil in the examination of these objects. It is not his duty to tell his own knowledge of them, but it is his duty to present the objects in such a manner as to allow the pupil to use its own powers. As all knowledge is obtained through the senses, the child must be trained to use all his senses that may be employed in the analysis of any object. This practice gives an accurate and complex image of an object. The elements of the image may be size, color, odor, hardness, condition of surface, temperature, texture, etc. As these are the component elements of a single picture, any one of them may recall the whole image.

This sensory analysis is more than a mere exercise of the senses, it involves the whole brain. It engages the powers of comparison judgment, association, relation of cause and effect, and establishes the relation of the object to other things. This rational method of sensory training is the only scientific method of examining objects. In his earliest years, the child's powers of comparison and judgment and reason are quite limited. But as he increases in experience his fund of images being greater he is permitted to exercise greater power of comparison and judgment. Thus, year by year the proper training should develop the whole brain, the sensory nerves becoming more and more responsive to an increasing variety of environmental objects, the associative fibres more responsive to a greater variety of casual and related forces, and conditions. The student can make clearer images of his whole environment, both material and spiritual. By this method, he soon discovers those generalizations used in the common affairs of life and applies them in his daily contact with the world. This is the only practice that can prepare a pupil to use his inherited brain in the interpretation of a modern environment.

A SUGGESTION FOR NATURE-STUDY IN NORMAL SCHOOLS

By LAETITIA M. SNOW

Farmville, Va.

While many attribute the failure of nature-study work in the grades of some schools to the lack of appreciation for, and love of nature on the part of the teacher, I doubt if any valuable or useable inspiration can be acquired without a certain body of facts. It is probable that the greater difficulties lie in the teacher's lack of information and inability to handle material.

The acquirement of a body of facts, by study, reading and investigation has been frequently discussed, hence we will consider briefly the manipulation of material. After the necessary courses in botany and zoology the student enters the method where the use of the acquired facts will be treated. They may discuss methods of presentation, prepare papers and lesson plans *ad nauseam*, but still the inability to *handle* the subject will be noticed when the students enter the practice school. How can this be remedied? The following appeals to me as a method for overcoming the difficulty.

We will take as an example a young teacher beginning the study of caterpillars in the Fall. She may be familiar with the common forms, may have read that certain plants are their food, and that certain methods are the best for their preservation, but finds it awkward, for lack of practice, to put this knowledge into use. Why not devote the major part of the method course to *doing* in laboratory exactly the things the student will do when she teaches? It may be argued that a sensible girl will easily find out how to make live cages and aquaria, to stock them and care for them properly. In all probability she will *in time;* but in the meanwhile the work is delayed, results do not come, and the interest of the children has cooled. In cases where the children take personal care of the specimens, the teacher should have had actual practice in order capably to direct them.

Each student should find her own specimens, bring in food plants, make the vivarium or aquarium, stock it, keep it in order, study the difficulties connected with it, the possible causes of failure and the best ways to prevent or remedy them. She should kill, mount, label and preserve her own museum specimens. In

garden work it is better that she have a plot of ground and do *just* the things which would come, for example, in a seventh grade class in "agriculture." She should go out, lay off the plot, dig up the soil, fertilize it, plant, water, tend and study the plot as she will expect her pupils to do. It will lessen at least the number of unexpected results. A practical course like this will give her greater facility in handling her subject than one crowded with discussion and methods of presentation. If such exercises in handling as many kinds of material as possible be given, it would, I believe, help to solve the problem of training teachers of nature-study.

USING TREES FOR NATURE-STUDY

PROFESSOR W. L. FLOYD
University of the State of Florida

The study of trees, considered either singly or as forests, offers fine opportunity for seeing accurately, reasoning correctly about what is seen, and establishing an interest in objects of great economic importance. Material is easily found; in cities and in the country. I find along a small stream within five minutes' walk of my school, species of pine, liquid amber, tupelo, oak, basswood, hornbeam, maple, magnolia, hickory and cypress. From all of these lumber may be made, some of which is adapted to special purposes; and wood and other products are of value. I doubt not that an equal number of species may be found near enough to visit and study by the pupils of almost any school in the South.

Our trees are rapidly being cut, interest in their preservation or reproduction should be aroused. In connection with the studies of language, geography, history and civics, we may teach the children to know the kinds of trees in the vicinity, their important characteristics, products, relative value, and relation to industrial development. Thus, they would be brought into contact with concrete things that enter into their daily experiences. Arbor days may be made occasions for the study of trees best suited for shade and ornament and even extended to include legislation for forestry, and the national forestry policy.

Some European nations are so managing their forests as to obtain a large supply of wood, lumber, and other material from them, and at the same time growing as much on the land as is con-

sumed. Let us profit by their examples; and as a means of doing so, let us learn how they do it, then teach it to our children, along with a love for the trees and an appreciation of their value.

ARITHMETIC APPLIED TO CORN AND PEANUT CULTURE

By T. E. BROWNE
Ahoskie, N. C.

1. A man plants two fields of 10 acres each with corn. In number 1 he uses seed corn selected in the field. In number 2 he uses seed selected in the barn. The cost of fertilizers and labor for each field was $10 an acre. Field 1 produced 445 bushels; and field 2, 36 bushels an acre. He sold the corn at 60c a bushel. Allowing $4 an acre for rent of land, what was the profit on each field? What percent. was gained in the above by selecting seed in the field?

2. Two farmers plant five acres each in peanuts, using the same kind of seed. Mr. A. spends $1.50 for lime, $3.00 for commercial fertilizer and $2 for land plaster to the acre. Mr. B. uses the same as the above except the lime. Rent of land and cost of labor was $7 an acre for each. Mr. A. made 1500 lbs. and Mr. B. 1000 lbs. an acre which they sold at 3c a pound. How much more did Mr. A. get for his crop than Mr. B.? What per cent. was made on the money invested in lime?

4. Two farmers raised peanuts on adjoining farms of equal fertility. Mr. Smith uses seed carefully selected and saved. Mr. White uses seed from the bulk of his crop unselected. Mr. Smith sells $60 worth of peanuts per acre and Mr. White, $39 worth of peanuts per acre. Cost of seed, fertilizer, labor and rent of land was $20 for each acre of Mr. Smith's land and $18 for Mr. White's land. They planted 15 acres each. What per cent. was gained by carefully selecting the seed?

NATURE-STUDY AND ELEMENTARY AGRICULTURE IN THE COUNTRY SCHOOLS

By M. H. CRUMP, C. E.,
Bowling Green, Ky.

Fifteen years practical work and observation has convinced the writer that the rural school-house offers a splendid field for the introduction of real nature-study.

The really serious difficulty is to find the teacher who is competent, sincerely in earnest and studiously willing. Such a teacher will not only know things when seen but will be able to put her information to practical use by doing. The children will learn by doing, seeing and hearing and will carry information into their homes, where it may be of great practical use. The rapidly increasing demand for such practical instruction will certainly produce the supply and many normal schools are already doing much along this line. The time is not far distant when every village as well as country school will have a teacher competent to give practical instruction in agriculture.

More than seventy per cent. of the people of the South Atlantic, Mississippi Valley and Western States are engaged in agricultural or similar pursuits; and it is very essential that the children of this teeming population be trained to remain on the farm and to practice intensive rather than extensive farming. With successful farming will come a real love for the vocation and a consequent lack of desire to flock to the cities and towns.

The successful teacher in the rural district has a splendid opportunity to lead the children along such wholesome, practical lines as will make that, best of all human products, a good citizen.

How many of your friends and acquaintances can tell you the names of trees, plants, birds, stones, insects or soils which constantly surround them? Why such lack of agreeable and frequently practical information? It is because nature-study has been the privilege of the few instead of the many. The material for such study is at the very door of the school-house. The simple request of each child to bring a handful of earth from the garden or field will furnish material for days. The physical, chemical and geological conditions of each soil can be carefully pointed out and explained so that a ten-year-old child can soon

learn to distinguish a sandy soil, or a loamy or clayey one. A mixture of these with sufficient humus may be shown to make a fertile soil, while the lack of plant food with similar physical conditions will indicate a sterile soil.

Such information is not to be had instinctively, neither can it be obtained from books; the eyes of the child must be opened and such facts must be pointed out by the efficient teacher. Much of the text-book teaching is about as effective as learning to swim by sitting on the bank and watching the swimmers.

The preparation, planting and cultivation of the garden, together with a simple method of cooking a wholesome meal, are matters of the first importance, and should be taught as nature-study in every rural school. With these should go the simple rudiments of cleanliness and personal hygiene.

NATURE-STUDY FOR THE FIRST THREE YEARS OF SCHOOL

By ETTA SPIER
Goldsboro, N. C.

The following outline for nature-study was prepared for the Training School of the Normal College at Greensboro, N. C. Many teachers who are interested in nature-study feel the need of some guiding outline. It has been the aim to make the following a simple, helpful, suggestive outline, but one not to be rigidly followed.

When a little child first enters school he is deeply interested in the world about him. His feeling of love and kinship with the feathered and furry creatures is as great, if not greater, than with his fellow man. Every tree and flower has a soul and life to him, and his pet dog is as decided a personality as his little brother. The teacher should use these natural interests and so not only broaden the child but bring joy and life into the schoolroom and a truer understanding and sympathy between the teacher and pupil. The prime object of nature-study is not to teach science or scientific facts, but instil a true love and right attitude towards natural environments, so making a saner, happier, broader individual.

In this outline the general life of the school and usual course of study has been considered; and the suggested nature-study may

be used so that it will prove a great aid in reading, language, geography and other studies.

First Grade

Fall. (1) Study of pet animals. Dog, cat, horse and cow—as to simple structure, habits, food, adaptation, bodily covering and importance to man. (2) Fruits. Apple, orange and grape—as to form, color, size, surface, pulp and seed. (3) Coloring and falling of leaves—advantage (study the maple). (4) Rest of animals. Moth, larvæ and cocoon formation observed. (5) Departure of birds. Hibernation of animals.

Winter. (1) Study of nature's protection against the cold. (2) Study of clothing. The sheep—man's use, as well as structure, habits, etc. Leather (referring to study of cow). (3) An evergreen—the pine. Compare with maple. (4) Snow and its uses to Nature. Children of the snow, their homes, clothing and habits. (5) Birds—blue jay, woodpecker, and snow bird.

Spring. Nature's Awakening. (1) Development of buds into leaves and flowers. Special study of maple and fruit trees; learning blossoms of different fruits. (2) Familiar seeds and their germination. School-garden. (3) Return of birds. Butterflies and moths. Learn robin, wren and bluebird.

Throughout the year daily observations upon the sun, moon, winds, clouds, rain, snow, dew, frost, fog, etc.

Cardinal points learned. Weather and direction of winds—inferences. Record of fair or cloudy weather, rain or snow, kept on Nature chart.

Second Grade

Fall. (1) Study of rabbit. Structure, habits, adaptation, food, etc. Disadvantages from failure to store food. Squirrel as comparison. (2) Study of nut trees. Storage of food in nuts. Oak, hickory, walnut. (3) Learn to identify all birds that do not migrate. Make list. Learn to know by sight, color and notes. (4) Collect cocoons and learn names of common moths and butterflies—larvæ—shape and size of cocoon and moth.

Winter. (1) Shelter of man from cold. Primitive homes of skin and bark. Modern houses in comparison. (2) Primitive methods of cooking and fire making. Properties of flint and uses by primitive man. (3) Primitive and modern mills.

Spring. (1) Study of birds as in First Grade. (2) Fruction of flower. Interdependence of insects and plants. (3) Germination of hickory, walnut and acorn. Special reference to use of stored food in seed. Also, use of corn, wheat, peas, etc. School-garden—special attention to study of grain. (4) Keep a chart of returning birds. Learn by sight and by sound. (5) Keep aquarium and study water life (Life history of Frog).

Weather study of First Grade, continued and expanded—semi-cardinal points learned. Cloud names, and most prominent constellations.

Third Grade

Fall. (1) Grasshopper as to structure, habits, adaptation, to environments, food and enemies. (2) General "shiftlessness" of insects and consequence. Bee and bee-hive studied. (3) Learn to know common trees by leaves, shape and branching of limbs, bark, etc. (4) Dissemination of seeds. Make collection of seeds and simple classification. (5) Continue study of birds.

Winter. (1) Study coal—physical properties of carbon in charcoal, coal graphite, etc. (2) Combustion—conditions necessary. (3) Warming and ventilation of home and schoolroom. Expansion of air by heat. Air currents. (4) Evaporation and condensation. Clouds and precipitation. (5) Expansion of solids and liquids by heat. (6) Study of thermometer. (7) Study of some fresh-water fish. Its breathing. (8) Study of soil—origin and kinds. (9) Water. Work of running water (erosion). Work of frost and ice.

Spring. (1) Study of bee continued—rearing of young, life history, hive secrets, treatment of queen, drones, ventilation, cleanliness and swarming. (2) Interdependence of plants and insects. Cross-fertilization and advantage to plant. (3) Study of slopes. Gradual hills. Steep-mountains. (4) Study of brook. Water divide; basin; three slopes; valley; bed; current (slope of channel); banks; water-fall.

CHILD STUDY IN NATURE-STUDY

By W. J. McCONATHY
Principal of Normal School, Louisville, Ky.

In pursuance of a series of experimentations with children for the purpose of testing their ability to use their sensory nerves and association fibres of the brain in the study of physical facts, the following lessons were given: On October 21, 1908, before a class of pupils, from seven to nine years of age, in the second year in the primary school.

I picked up a tumbler which was lying on the desk, and holding it mouth upward, asked the pupils if there was anything in it. All answered, No! When the tumbler was held with the mouth down, some said there was air in it, but none would admit that air was in it when held with the mouth up. I then put a small piece of paper on the water in a large open-mouth glass jar partly filled with water, and plunged the tumbler down into the water over the paper. The children were allowed to gather about the desk and watch the experiment. They all saw that the water did not fill the tumbler. When asked why, nearly all answered that there was air in the tumbler and that the water could not get in. One little bright-eyed boy said that the carving

around the tumbler about a half inch from the top kept the water from going in. I noticed the water reached to that band. I then took a plain tumbler and they saw that the water entered the tumbler only a short distance, the same as at first. They all admitted then that it was the air that kept the water from filling the tumbler. I then passed the experiment over to my assistant, the teacher of science. He handled the tumbler in every position, but they would not admit that it contained air unless the mouth was held downward.

He then took a flask partly filled with water, fitted with a cork containing two glass tubes, one ending in the air space, the other below the water surface. By blowing into one tube the water was forced out the other. Several said, "You had water in your mouth."

He then called a little girl to come up and blow. She did so and the water spouted out. Several others did the same. Then some of the children said, the air in the flask pushed the water out. After they seemed satisfied about this we ended the experiment, but asked some general questions to find out why the tumbler did not hold air when held mouth-up. He asked if we should dig a hole in the ground ten feet deep would the air go into it? They answered, "No."

How does air get into the cellar?

"Oh! Through the side door, or windows, the wind blows it in." We left them holding the same views.

I watched the faces of the pupils during the experiment and most of them expressed earnest interest, in fact, more interest than is usually seen in classes of much older pupils.

We then passed to the fourth-grade class, two years in advance of the latter. We had nearly the same results. None would admit that the tumbler contained air when held with the mouth up.

Following up the first experiment, it became necessary to prepare another experiment to prove that there was air in the tumbler no matter in what position it was held. To do this, we had a cork which fitted the tumbler. In this cork was placed a glass funnel and a delivery tube. We also had a jar partly filled with water. We then took it before a second-grade class. The operator held the tumbler in various positions and asked them the ques-

tion, "Is there any air in the tumbler?" They would admit that there was air in the tumbler only when it was held mouth down. Holding the tumbler, mouth down, the teacher fitted the cork with its funnel and tubes to the mouth of the tumbler. He showed them that it was tight, and if anything was in there is could not get out. He then held the tumbler mouth upward, allowing the delivery tube to pass over into the jar of water. The children admitted now that there was air in that tumbler. He poured some water into the funnel and the children noticed and exclaimed, that there were air bubbles coming up from the water in the jar!

A test-tube filled with water and inverted was held under the water over the mouth of the delivery tube in the glass jar, and the children saw that the water disappeared from the test-tube and went down into the jar. When the teacher poured some more water in the funnel they noticed that the bubbles would come up and the water left the test-tube. The children noticed that water poured through the funnel into the tumbler was filling up the tumbler and as they said was pushing the air out of the tumbler through the delivery tube into the test-tube. He then commenced the experiment again. Holding the tumbler mouth downward, he fitted the cork (calling their attention to the fact particularly) and went through the same process of pouring the water through the funnel and they saw the bubbles rise in the jar and force the water out of the delivery tube into the test-tube, and, in fact, saw the effects as they did in the previous exhibit. They were no longer able to find any objection to what they saw and admitted that there must have been air in the tumbler when it was held mouth upward. And again, he commenced by handling the tumbler in any way, and fitted the cork, and went through the same processes and they saw the same effects.

We repeated this in the fourth and fifth grades. The fourth grade children fought a little harder over their opinions, but finally agreed that there must be air in the tumbler held in any position. They further agreed that a hole in the ground ten feet deep would contain air. When further questioned, they admitted that all animals needed air in order to live and that those animals that live in the ground must have air, and, therefore, that air must get to them through the cracks and holes in the ground.

The children of the fifth grade more readily admitted the results of the experiment. They were questioned as to why a

balloon would rise. At first they answered that you had to put gas in them to make them light and the gas would carry them up. Their attention was called to the smoke that rises from the stacks and chimneys, and to the dust and little particles of things that they saw moving in the air, and to little bits of light matter that might be dropped from the window, and asked what held these little things up as they did not have any gas in them. The children readily answered that the air held them up. "Why did the air hold them up?" Answer, "They were lighter than the air." Then, "Why did the balloon rise in the air?" The pupils finally reached the conclusion that when the balloon was made lighter than the air the air would hold it up.

In the conclusion of the lesson the pupils grasped the idea of gravity and by series of questions they were finally led to conclude that as air was matter, gravity tried to pull it to the earth. The cold air was heavier than heated air and that gravity had more effect on heavier matter than on lighter matter. Throughout the whole lesson the children gave marked attention and many of them were constantly ready to give opinions and ask questions.

One little incident in the second grade is worthy of mention. A little bright-eyed boy seemed to be jubilant over the idea that there was no air in the tumbler when the instructor poured the water into the funnel; and when he discovered air bubbles coming up in the jar, he leaned back in his seat and his face changed from its happy expression to an expression of abject disappointment. It showed conclusively that his mind recognized the facts of the experiment.

AMERICAN NATURE-STUDY SOCIETY

Annual Meeting. This will be held in Boston during the week of the meetings of the American Association for the Advancement of Science. The exact date will be announced as soon as it is possible to avoid conflicts with important science meetings.

It is probable that the main topics for discussion will relate to the organization of courses of nature-study for elementary schools.

The next issue of THE REVIEW will announce the nominations by the Council for officers to be elected for 1910. It should be noted that the constitution provides for additional nominations by groups of members.

Increasing Membership. Many members are now working to increase the membership and the financial resources of the Society for next year. Several members have agreed to be responsible for a share in any deficit which may result from publication of THE REVIEW in its present form, averaging thirty-two pages for nine months. Many more such subscriptions are needed. Several normal schools have sent many applications for 1910 membership or subscriptions to THE REVIEW. But we are still far from a safe basis for 1910 plans; and it will be necessary to guarantee expenses in order to secure the acceptance of the men who will probably be nominated by the Council for the positions of secretary and editor for 1910. For these reasons the present secretary and editor asks for the greatest possible cooperation in the attempt to increase the membership and financial resources of the Society. Since it has proved impossible to estimate the number of subscriptions which may continue from year to year, it will aid the officers in making plans for next year if members will send the annual dues for 1910 before December 10th.

Sample Copies and Circulars. Members who can use sample copies of THE REVIEW or circulars concerning the Society may obtain them from the secretary; or they will be mailed direct to addresses sent by members.

Back Numbers of The Review. Attention is again called to the below-cost prices of certain numbers of THE REVIEW (see advertising pages). These will soon be withdrawn. Several colleges and normal schools have recently purchased 10 copies each of certain important numbers. Send the dates of the numbers which you most need for your classes and the secretary will quote you the price on the those available in the broken sets.

Readers who wish to sell complete sets of Volume II, 1906, in good condition, should so inform the secretary, who will record the names of owners in order received and inform those who wish to purchase. Several libraries have recently offered to pay $2.35 for the numbers of this year. The secretary will pay 50 cents each for perfect (in numbered pages) copies of January 1906, Vol. II, No. 1; and from 20 to 35 cents each for copies of February, March, May and September, 1906.

CORRELATION IN NATURE-STUDY

By C. A STEBBINS
State Normal School, Chico, Calif.

Elementary courses of study, as of yore, still seize the baby pupils, bubbling over with life, place them in the schoolroom high chairs, and feed them ever after on books, books. The small boys and girls are carefully weaned from all large active, living things.

As school children all roads lead to the high chairs, as citizens and teachers all roads lead to books and a high-chair life.

While window boxes and aquaria may have their places, that of bringing a piece of the creeks and the country to city children, the writer is glad that teachers cannot bring the gardens and the creeks into the schoolroom.

If we desire to make the boys and girls immune to the attack of schoolroom fungus, which fills them with the mycelium of dislike for the school, which makes books and desks their memory focus, and which finally drives them from the school, we must bring them in contact with large, active, real things and let them see and feel the forces of nature working thereon.

The following is an account of how the school gardens are the hub upon which a miniature world revolves at the California State Normal School at Chico. The account should be read with a large perspective, keeping in mind that the gardens carry a part of the community life with it and is in addition the working ground upon which nature demonstrates her great principles and points out the action of her correlated forces.

The central aim of the work is correlation. Its main burden, as a system is to show the relation that one force bears to another; to show how these forces seem to work towards man's comfort, when led by his will, thus making the child more appreciative of these forces and fitting him for better citizenship.

A school should endeavor to make the real business and social apprenticeship of its charges as short as possible. Chico is a fruit center. We have taken the hint and a considerable portion of the garden is devoted to horticultural work. Each spring term the sixth grade plant peach pits, "piece" roots, etc. The following year the young seedlings are budded and grafted, each individual caring for four or six trees. The pupils prune and cultivate their

trees and by the time the normal department proper is entered they may pick fruit from their trees.

When insects appear on the trees war is waged against them. The past year brought the unwelcome woolly aphids to the apple trees. The fight was a serious one and the trees were sorely wounded ere the aphides were routed.

Little is done with insect life until the children come in close relation with it. As the plants develop, the children meet insect pests face to face. The cabbage leaves are eaten by the larvæ of the cabbage butterflies, the tomato vines suffer from tomato "worms," and the pupils realize that to save their plants they must destroy the pests. Thus the study of insects becomes vital to the children.

Insects are studied from four points of view: 1. Are they harmful? What is their life history and if harmful in which stage can they be reached most readily with insecticides or other means of killing? 3. In this stage, do they obtain their food by sucking or chewing? 4. How can they be destroyed?

In the study and control of such an insect as the woolly aphis, the pupils are brought in contact with many forces. There are the forces brought into use in the working of the spray engine; in the preparation of the spray chemicals, among many others.

We have one class quite well versed in insect and fungus spraying. It acts as a demonstrating class for our patrons. Upon a call to the department this group visits, studies and treats whatever pest it may meet.

During the fall term, particularly, experiments are performed to point out and to bring the pupils into close touch with the forces and principles working in and with the soil. In the spring, each class has one or more experimental plots to determine further principles in agriculture. The school garden should teach the community the value of intensive gardening. Again chemistry, physics, etc., play their parts.

For many years after graduation from a good high school, capillary action meant to the writer a glass tube containing a column of water with a concave surface; acids were fluids that colored litmus paper. Such unnatural selection or isolation of forces from their working ground cannot be too strongly condemned. The true science method is coming to be the study of all the correlated forces working upon some particular object

whether it be in the making of a loaf of bread or in the life of a plant. Simple experiments may readily be devised to show capillary action in soil, also the working of acids.

To illustrate how forces may group themselves around a lesson in nature-study let us take a part of our fall work, the harvesting of our sugar beets. The beets are taken up and the tops cut off an inch or so below the leaves (to avoid minerals which collect there). The roots are then shredded with graters. This material is placed in a sack and the juice is pressed out. To prevent fermentation, lime is stirred into the liquid. Carbon dioxide is now made and passed through the juice to cause impurities to settle to the bottom. The process is completed by siphoning the juice into another dish by filtering, and by boiling down to sugar. It is not necessary to point out the botanical, physical and chemical phenomena which are studied in the above process.

After the class method has been well studied, we aim to visit a sugar factory and compare the business man's process with that of the school.

"To name an object is to control it" in many ways at least, we might add that to name a thing is to give it personality. The name of a new friend is our first interest. Working from this viewpoint, we teach the children the names of our common trees, flowers and weeds.

In the fall term a weather bureau is organized. The following pieces of apparatus are used; barometer, maximum and minimum thermometer, magnetic needle, hygrometer, small windmill, weather vane, centigrade thermometer, and rain guage. Most of the material is made by the boys and girls. After the apparatus is in place, a letter is written to the State Observer asking for a set of observational blanks and requesting that the daily state weather charts be mailed us. In addition to the readings desired by the State, the children make individual and class charts noting the following: Date, clear or cloudy, kind of clouds, amount of precipitation, air pressure, temperature of atmosphere and soil, dew or frost, direction of wind, size of raindrops, and conditions of plant growth.

The children elect a weather prophet whose duty is to predict the approaching changes in the weather. The predictions are posted in the schoolroom daily. By studying the relation between clouds, pressure of air, winds, and by observing the State

weather charts daily, the children become quite expert in determining approaching changes. A careful study of one month's readings points out the relation of weather phenomena to plant life, thus indicating the value of weather study as typified in the United States Weather Bureau.

Considerable time is spent in the study of the forces that are grouped around and express themselves upon the apparatus of the bureau.

We point out how man has utilized these forces in working out his own comfort. He has used the wind to pump his water, pointed out by the small wind mill; magnetism to determine direction, illustrated by the magnetic needle; pressure of air, change of temperature, etc., to save his vegetables and fruit. Man's progress is determined by his ability to utilize natural forces in manufacturing power to reduce his own friction in living.

Since isolation of any subject means wasted energy, the forces of heat, magnetism, winds, etc., are studied to the end of their use in determining future conduct. That heat is poorly conducted by wool as an isolated fact means nothing, but if it determines conduct in wearing clothing it means much.

More and more are we brought to see that the present complex human life calls for the individual with well formed habits which have cleaned his keel of the moss of boorishness and the barnacle of society ignorance so that he may sail unhampered through the social sea. The gardens are made to offer opportunities for forming correct social views early in life. Early in their garden life, the children are taught to respect those things that belong to their neighbors; to realize that community property belongs to the whole not to a part but that each must offer his support; to understand that the policy which is best for the majority must be supported; to feel, in general, that each represents but one small part of a great whole and that each must do his best to fit in smoothly and "laugh with the world" rather than to be shoved aside "to cry alone."

Noon hour observations, showing boys hurrying to the baseball field with a piece of bread and butter in one hand and a baseball bat in the other, hint of future stomach troubles and friction in table manners.

The boys and girls physically and socially demand a lunch table. Shall we not have a large table where the pupils may eat

their individual lunches and be served with the output of their gardens? With a teacher at the head of the table, a social atmosphere might be created which would offer much to many socially starved boys and girls, and which would materially lessen the friction in their future lives.

Each spring special vegetable dinners are given by the higher classes. The girls prepare the vegetables, while the boys do the heavy work. It is a pretty and a natural sight to see the girls becomingly attired in aprons, stirring the cooking vegetables and the boys industriously peeling potatoes, cleaning lettuce, etc., with a large table, prettily decorated, the center of it all. The value of such lessons is too far reaching and too complex to receive further comment.

Many of the formal demands made by society are taught the children through creating awkward situations and by showing the children the correct procedure. Marches and music aid in adding pleasure to such lessons.

Nature-study should aim in a decided way to give the children material that they can use, material that will help to govern their future conduct. In the study of bacteria by experimentation, the boys and girls receive information that is most vital in determining their future conduct.

The vitality of our main efforts seems to rest in money, and the financial returns from the gardens have made the garden work real. Any business, as it develops and becomes more complex, calls for new methods, so the increasing financial and business side of the gardens and the need for more practicability in school work called for a school bank.

One was organized last term. Officers were elected from a section of the seventh-grade arithmetic class and they went to work with a great deal of enthusiasm. Fixtures, railing, etc., were made just as bank-like as possible by the manual training classes. The training school print shop printed checks, notes, bankbooks, and all other necessary papers. The bank took control of the gardens and leased the plots to the children from the fifth grade up. Actual leases were used. They were made out with the assistance of the teachers, taken before a school notary, signed, and sealed. The pupils promised to give the bank 15% of the output of the gardens, to do all in their power to get large returns from the land, to take care of all buildings and tools used

by them. In return the bank furnished land, tools, buildings, water and seeds.

The school market produced many financial returns and at times the bank had deposits amounting to twenty dollars. One small gardener, a boy, cleared seventy cents from a plot 4 x 5 feet, others made profits ranging from five to fifty cents from similar plots. The bank not only handled the garden funds but carried with it the financial business of the print shop and the Boys' Athletic Association. As stated elsewhere, the bank was placed in charge of an arithmetic class. This class kept the books, thus meeting real vital problems and coming to realize that arithmetic after all is merely a vehicle for business transaction and individual convenience.

This coming term a real "up to date" safe is to be added and the work continued, we hope, with even greater success.

To know the essence of a principal it is necessary to be a part of its expression. To understand interest fully, as an example, one must borrow, or loan money, or be connected in some way with interest at work. So the bank aims to make each pupil an acting part in each business transaction indicated by the study of an arithmetic text, that is, transactions are sometimes indirectly created. The acceptance, endorsement, presentation and receipt of money, processes connected with one check, short cut the way through the days of artificial processes now in use and seldom applied.

The business life of a community centers about the public source of money. Thus the school bank inoculates the children with many of the principles that will direct their future conduct in their later community life.

Each individual child or adult is the center of the universe, so far as he is concerned, so it is the teacher's duty to focus the course of study, the community, and the universe upon the child. The writer believes the scheme of correlation as given on preceding pages will help to do it.

DEPARTMENT OF SCHOOL AGRICULTURE

With this number of The Nature-Study Review begins a department which will be known as School Agriculture. Various phases of agricultural education as related to elementary and secondary schools will be discussed by workers from different sections of this country and Canada.

It is hoped to make this department a sort of clearing house for ideas and methods on this subject, and especially to make the work of each section of the country known to others.

Agricultural education (elementary and secondary) is now prominently in the foreground of educational matters. It is beginning its formative period, and no one knows just how it will differentiate and develop, but there is a widespread faith that something good will come out of the movement. Enough here and there has already been accomplished to justify this faith. No less than twenty-two lines of effort, more or less independent, are now being made, either as propaganda to increase interest in the subject, or in the actual work of solving the many problems involved in its introduction. Examples of the former are the state boards of agriculture, farmers' institutes, agricultural college extension, and discussions in educational meetings both local and national; examples of the latter are the recently organized departments of agricultural education in many of the State universities and agricultural colleges, agricultural instruction in most of the state normal schools, district and county secondary agricultural schools and the work of the United States Department of Agriculture, particularly through the office of Experiment Stations.

Among these agencies at work for the promotion of agricultural education there is naturally much difference in points of view and in reasons advanced for such instruction.

An analysis of the various ideas regarding the place and value of the subject reveals at least three points of view:

1. Economic, which recognizes the necessity of more intelligent agricultural practice to meet the demands of an increasing population on decreasing natural resources.

2. Educational, which considers agricultural education simply as one part of the general movement to relate school work more closely with life.

3. Social, which sees the basic nature of the subject, i. e., that it is wrapped up in all sorts of human interests, and that in-so-far as there is a general education along this line will those actively engaged in agricultural pursuits be able to make their best contribution to the good of the whole people.

The recent conference on irrigation and conservation of our natural resources are expressions of this point of view. Men in all walks of life are taking part in this movement but not until the masses of the people feel this interest will the individual directly concerned in the soil and its produce be able to make full returns, e. g., Destructive floods affect the productivity of the farm, but the floods may be largely the result of a forest policy over which the farmer has no control.

We are glad to present as the introductory paper in this department one by Professor William R. Hart, who was among the first in the country to call attention to certain of the broader educational aspects of agriculture.*

BENJ. M. DAVIS
Departmental Editor

Miami University,
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THE PLACE AND FUNCTION OF AGRICULTURE IN THE CURRICULUM

By WILLIAM R. HART
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All school studies have some value. Confusion in current discussions of the relative values of studies arises from the fact that writers fail to discern that but few studies can be measured by the same standard. Utility as a measure of value for school studies is being pressed just now more than any other standard. But utility in the evaluation of a study may apply equally as well to Latin as to manual training. Quite as much depends upon the purpose, the attitude, the point of view of the learner as upon the nature of the subject studied. This may make the study of Latin, or other language for that matter, even more utilitarian than the study of botany or chemistry. That this is true often

*_Educational Agriculture_, see Report of Neb. State Bd. of Agr. for 1906.

crops out in the argument for the study of Latin, one of the standard arguments being the aid a knowledge of Latin gives to the student of the sciences. At the same time, the student of science may be in pursuit of scientific facts and truths for purely scientific reasons with little or no thought of their application. This attitude makes his study of Latin purely utilitarian and his study of science disciplinary or cultural.

A subject of study should always be considered from two points of view when one tries to determine its right to a place in the curriculum. One point of view looks for the intrinsic worth of the subject-matter. The body of knowledge comprised in it is estimated without reference to its relation to other subjects. Its value is most often determined by the influence upon the mind of the learner which the pursuit of the study will produce. The mental residuum is usually spoken of as an increase in the sum of one's knowledge, or as an increase of the mind's mastering power due to the training obtained in the pursuit. This view of a study is one sided and incomplete. It can never give more than a partial answer to the question as to the real value of a subject in a curriculum.

The other point of view regards the subject more with reference to its bearing upon other subjects than to its content or to its effect upon the mind of the learner. The evaluation of studies from the standpoint of the relations they sustain toward each other affords the most rational basis for the organization of a group of studies into a systematic curriculum. Under this view no one study is considered on its merits as an independent body of knowledge. Its value is determined by what it contributes to some other body of knowledge, or, by what has been contributed to it by other subjects. The application of this principle is unavoidable in the arrangement of such studies as penmanship and composition. It is quite obvious in fixing the relative places of reading and history, also, in locating the several elements in a mathematical course. There is a sequence of parts. This holds true in regard to mathematics as a whole and certain lines of engineering, agriculture being an applied science in practically all of its aspects is an excellent type of study for consideration under this principle.

Agriculture is somewhat unique in this regard. As a science it is without even standing room but for the sufferance of other

sciences. On the plant side it is a component part of botany. On the soil and climatic side it is a part of physics, chemistry, and meteorology. On the animal side it is zoology, entomology, and bacteriology. On its industrial and commercial side it is identified with sociology. These propositions appear so nearly self-evident that no proof seems necessary to secure assent to them. It must be bourne in mind, however, that what has just been said applies to agriculture as a science. From these considerations it is evident that the scientific study of agriculture is a study of the applications of the laws and principles drawn from the domain of other sciences. No other study has ever engaged the attention of scholars which has so many different elements or aspects as agriculture. On this account, no other study offers so extensive a field for the application of other sciences. Almost every other science known to man is called upon in a greater or less degree for some contribution to the science of agriculture. From this point of view agriculture becomes the lure, the inspiration, the motive for the pursuit and application of scientific knowledge. But this is the field of the investigator, the experimenter, the expert, the specialist. There is another aspect of the study of agriculture much less profound.

The learning of the simple practical arts of agriculture is on a basis totally different from the exhaustive study of the subject as a science. The art or doing side of agriculture has been the slow patient work of ages. The indefinite and vague body of knowledge which has grown up partly by accident, partly by experiment and observation, has been the work of the farmer. This is commonly known as practical agriculture. It is one thing to know that doing something in a certain way will produce a given result. It is quite another thing to know the reason why the operation produces a given result. In the first case the result is considered reason enough. In the second case the law underlying the process is the reason.

Agriculture on its practical side contains a large fund of material well adapted for teaching purposes to those untrained in the sciences underlying its various operations. Right modes of planting may be taught without much reference to why some seeds are placed deeper than others. Good tillage can be taught even tho the laws of capillarity, soil temperature and the like are not understood. Legumes may be grown and plowed under and

other modes of soil enrichment may be practiced without much knowledge of bacteria, or, of the chemistry of fertilizers, or, of plant physiology. Seed selection may be carried on quite extensively with little or no knowledge of the laws of heredity. Feeding one ration to obtain milk and another to produce flesh need not involve much knowledge of the physiology of assimilation or of the chemistry of digestion. Spraying for insects and fungi as a protective measure need not imply an extensive knowledge of entomology or cryptogamic botany. Grafting, budding, and other forms of propagation need not rest on a very broad knowledge of plant anatomy and physiology.

Learning to do the things in the foregoing summary has some very decided educational values. One of its values lies in the fact that it stores the mind with a fund of experimental knowledge. This makes it vital to one's thinking. It is also valuable as a stimulant to the inquisitive mind looking for the real reasons why things transpire as they do. It is further valuable as affording a reservoir of material for example or illustration to one in pursuit of a law or principle in the natural world.

From the discussion thus far it seems reasonable to conclude that the study of agriculture may both precede and follow the study of the underlying sciences. It may also accompany the study of some of the sciences, may even be identical with them. An experimental study of the structure, propagation, growth, and improvement of the corn plant is both good agriculture and good botany. The place and function of agriculture in a complete school curriculum, therefore, is indicated by these three characteristics. It furnished a good body of material which may be used as a point of departure for the study of the other sciences. It contains much material identical with good material in other sciences thus giving impulse to a further study of those sciences. It also opens a vast field for the application of the laws of other sciences. This three-fold characteristic makes agriculture a study adapted to almost every type of intellect, and to practically every stage of mental development.

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The articles in this issue have been collected and edited by Dr. Ruth Marshall, of Rockford College, Rockford, Ill., formerly instructor in nature-study in the University of Nebraska.

SOME BEGINNINGS IN NATURE-STUDY

By CHARLES E. BESSEY
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In a paper read before the Iowa State Teachers' Association, December 28, 1876, I advocated the study of nature as tending "to arouse in the young a love for plants and animals, and a curiosity about stones and fossils, the wind, the snow, the rain, and the thousand and one natural phenomena which too often are entirely unobserved, or if observed, scarcely more intelligently than by the wild Indian." In discussing this matter further I said: "There are many boys and girls who need but to be guided to make close observers, or careful collectors. They readily learn to use their eyes, and it is astonishing what rapid progress they can make, and what enthusiasm they are capable of exhibiting. While a teacher in the common schools, I saw some wonderful developments of this kind. I once organized a class in natural philosophy, in a school where the old routine of reading, writing, spelling, arithmetic, geography, and grammar had never within the memory of man been varied from. I gave the class a plainly written book filled with excellent woodcuts. Being an adept in whittling, I constructed, during my leisure moments, many little pieces of apparatus for illustrating the topics taken up from day to day. As the schoolroom was merely a common single room, the class recited in the presence of the

whole school; and I may almost say that the *whole school* took part in that exercise. Grammar, geography, arithmetic, play, mischief, drowsiness, all gave way to intense interest; even the little six- or seven-year-old watched and listened with glistening eyes and attentive ears. My devices were all duplicated, and my experiments were repeated morning, noon and night a hundred times. A mill in the vicinity was invaded night and morning by an eager crowd of boys, and no mechanical arrangement from the big water-wheel down below to the dusty pulleys and cog-wheels in the attic escaped them. A company of them took a twenty-mile ride on a bitter winter day, in order to examine the mechanism for reversing the motion of the locomotive engine. The country was ransacked by these embryo scientists, and old and forgotten apparatus was brought to light and made to contribute to our stock. And yet this was in a common school, and the pupils were such as you may find in thousands of places in Iowa.

"But this was not all; their enthusiasm was not expended upon natural philosophy alone. One morning a boy brought a little stone containing a fossil, and laying it on my table, asked what it was. I told him; and after an hour or so, made it the text for a short geological lecture to the school. Soon the stones began to come in, and some mornings my table was literally covered with the contributions from my amateur paleontologists. In this again the whole school seemed to be interested. I shall not soon forget one little fellow, the only one whose eye I could never catch while talking about the specimens before me, and whom I supposed to be utterly indifferent to all this scientific furore. One evening I was walking alone to my boarding place, an hour or so after the close of school, and as I rose above the crest of a hill, I saw in the distance some one, with a great stone held in his two hands, hammering vigorously a large rock by the roadside. I soon found that it was my pupil, and so intent was he that he did not dicover that he was observed until I approached quite near to him, when dropping his stone and seizing his basket, he marched on with an air of the utmost indifference for me, or for rocks, or for fossils. And yet a day or two later that little fellow brought me a magnificent specimen of a fossil coral."

This took place in a country school in southern Michigan in 1867–8, more than forty years ago, and I reproduce it here to

show what was being done at that time, and it was this aspect of nature-study that I presented to the teachers of Nebraska schools nearly twenty-five years ago.

In the earlier years of the movement for nature-study in Nebraska, a vicious tendency to make it quite symbolic gained some headway and required much vigorous combating to overcome before it subsided. Many teachers who knew practically nothing about any department of nature attempted to lead the children in the study of plants, the result being a frightful hodge-podge of misinformation as to the plants, and ridiculous attempts to liken flowers and fruits and leaves to people, or to connect them with crudely conceived fairy tales. And I have had middle-aged teachers stoutly maintain that this was nature-study; and they were much aggrieved when I pronounced it not only of no value whatever, but positively harmful.

But the fairy-tale type of nature has now practically disappeared from Nebraska, and flowers are now examined for their own sake. The fruits are cut open and looked at and tasted as fruits, and not as something else. So, too, the leaves are leaves, and not "hands" or "faces," or anything else *that they are not.* I am not prepared to say that some belated teacher in some part of the State may not be likening plants to people or fairies. But there is very little of such stuff now taught "in the open." Our best teachers, and there are a great many of them, know better and study nature in a natural way. With them a plant is a plant, a flower is a flower, and these are studied as plants and flowers. And the good effect is seen in the students who come up from the schools and enter my classes in botany. They know something valuable about plants. They know what the inside of a particular fruit looks like, they know the structure of many a flower, or even of some of the lower plants. They know something of nature, because they have studied nature.

NATURE-STUDY IN RURAL SCHOOLS

By E. C. BISHOP
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The teaching of nature-study in rural communities often results in failure because of the difference of view-point on the part of the teacher and that of the pupils and parents. Too many parents and pupils have thought that nature-study means the collection of old birds' nests, insects and other material for the purpose of giving the children something to do. This faulty idea comes doubtless from the acts of misguided teachers who attempt to teach nature-study without knowing well their field of operation. To many good people, the work of nature-study suggests "baby talk" and the wasting of good time in gathering materials and talking about matters of interest to children's minds only. Nature-study is as large as the combined sciences. In order to get away from the prejudices against nature-study which have come from wrong presentation of the subject, it is necessary, in many communities, to enlist interest in the subject under a different name. So it is with home science and agriculture in many communities.

A community which refuses to sanction the establishment of agriculture as a part of the regular course of study in the school will encourage the study of agricultural subjects if introduced in a different manner. To cultivate an interest in some phase of the subject is the first step necessary to successful work. With the interest once awakened in some particular line of study it is easy to turn to other phases of the work.

In Nebraska the object was first to create proper interest in the study of agriculture and subjects related to home life. As an entering wedge, corn was chosen. The movement was not called a study of agriculture, of nature-study or of field crops. In fact, it was not given any name. Announcement was made through the county superintendents that the first 500 boys who sent their names and addresses to the State department of public instruction would each receive 500 kernels of pure Ried's yellow dent seed corn. The letters soon came. When a boy received his envelope containing the 500 kernels of corn he also received instruction to study the best methods of planting and cultivating,

to get the very best results possible, and to report the same in the fall after harvesting his crop. Many boys who failed to get their letters in among the first 500, desired to receive some seed corn. Accordingly, in a few counties the county superintendent arranged to provide a limited number of boys with good seed. In the early fall, it was decided to hold a state contest to which boys who had raised corn from seed furnished were invited to send the best ten ears they had raised, with a written report giving information as to kind and condition of soil in which it was planted and method of cultivation. A bulletin giving instruction as to the selection of seed corn was sent to each corn raiser. In counties where a large number of boys were interested, a local county contest was held, preceding the state contest. Premium lists were provided as an inducement to send or bring exhibits.

Because so many boys failed to write in time to be supplied with seed corn, a second division was added at the state and county contests in which boys who did not raise corn were permitted to select ten ears of corn from the fields of their parents and enter these in a corn selection contest.

While plans were being formed for the state contest a division was provided for the work of girls in cooking corn bread and other articles made from corn products.

The first state contest was held at Lincoln, and was a surprise not only to those not actively engaged in the movement but even to those in charge. For the second state contest 1,000 boys were provided with seed and a large number of counties made provision for county contests. In addition to corn, sugar beets, potatoes, and macaroni wheat were included. In the girls' work, the making of wheat bread, cookies and fried cakes, and the canning of fruit was added; while a division in manual training provided for the making of aprons, sofa pillow covers and exhibits of patching and darning. The boys made articles from wood designed for use or ornament about the home.

The third year the same kind of work was taken up with the exception that all those taking part were guided through the county and school organizations. The same plan had been followed in this the fourth year of the work. Butter-making is one of the new features.

The organization includes, first, the state organizations known as the Nebraska Boys' Agricultural Club and the Nebraska Girls'

Domestic Science Club. The county organizations are the same, with the county as a unit. School district organizations are the same, with the school district as a unit. In many cases the boys and girls clubs unite as one club. Meetings are being held this year [1908] during the month of November in 33 counties in the state, preceding the state meeting in December. At these meetings the young people bring exhibits in agriculture, domestic art and manual training. These articles are home work done through the encouragement and direction of teachers and superintendents. Hundreds of exhibits are brought to a central point in the county, generally the county seat. The state department of education and the University of Nebraska unite in sending to the meetings speakers and judges who award premiums and deliver addresses. The meetings vary in attendance from 100 to 2,000. The town and city schools in many counties adjourn school and unite with the rural schools in emphasizing the industrial work as carried out in the lines above mentioned.

These meetings are generally called "corn contests," although they include as much, and many times more, of other work. In some cases, all kinds of industrial school work are exhibited by individuals and by schools. These occasions have a strong influence in dignifying the work of the farm and home. It has brought the study of agriculture, domestic art and manual training to the homes of the people in a manner which appeals to the higher motives and creates a desire for more knowledge along these lines and for greater efficiency in work connected therewith. It has led to the establishment of regular courses in domestic science and manual training in several of our town and city schools and to a strong demand for the teaching of agriculture in all the schools.

The most encouraging feature of the movement to get better results in the rural school is the adaptation of some of the work which heretofore has been confined largely to high schools, special schools and universities. The tendency to withhold from the child until his general education is completed that part of education which is calculated to help him to better enjoy the home life, has lead to the crowding into his early school life the part of education which is designed to prepare him for further education with little regard to meeting the conditions necessary to enable the child to enjoy the results of education all along the line during the time of his early years.

But it has gradually come to us that that education which best fits the child to live, also best prepares him for receiving higher education. A happy, useful, intelligent existence during the years of elementary scholastic education provides the best foundation for higher education. In the more favored city schools manual training and domestic art have become regular parts of the courses of study. There has been a growing tendency to carry this work further down in the grades until we now have in many city schools the work in manual training and domestic art from the kindergarten to the senior year of the high school. This work is modified from the busy work of the little folks to the technical work of the high school.

There is as much need for this work in the rural community as in the city. We have too long evaded the issue by declaring that until we get the consolidated rural school the proper equipment and teachers cannot be provided for doing this work in the country schools. We cannot wait for the consolidated school. It is here in some places, and will continue to grow in favor, but there yet must remain for a long time thousands of one-room rural schools where ninety per cent of those attending get all the school education that they ever receive. We must give them such training that whatever direction their education may take afterward they will have received a degree of training that will open to them the possibilities for the fullest development of education for the life of the home.

This work can be successfully done in any rural school without special equipment or a specially trained teacher, by following the simple direction: Utilize the means at hand in doing the things which can be done at the time and place of service.

I can verify this no better than by giving the results accomplished in one rural school. This is the ordinary rural school with conditions less favorable than in many other schools. The results were reached largely because of the interest and activity of the teacher. I quote here extracts from a paper read before the association of rural teachers at the Nebraska State Teachers' Association, December 28, 1907, by Miss Lulu S. Wolford, the teacher in district No. 20, Pawnee county, Nebraska.

"I have been requested to lay aside all conflicting modesty, and to tell you exactly what has been accomplished during the past three years in a rural school in Pawnee county, known as the

Lower West Branch School, District No. 20, where I have been employed as teacher.

"The first endeavor was to awaken in pupils a desire to excel in all things; to gain their interest, confidence and co-operation, and then, really do something. I do not want my school to 'move along smoothly,'—I want it to work.

"Interest in this line of industrial work was first awakened by the announcement of our county superintendent of a meeting to be held one Saturday afternoon at Pawnee City, at which meeting all teachers were requested to be present and to bring with them any of their pupils who might be interested in the organization of county boys' and girls' clubs. On this particular Saturday it rained all day but a number of my pupils accompanied me a distance of about ten miles to the meeting. There we learned that the object of the county organization was to create an interest through the schools in some lines of agricultural, domestic science and manual training work. The county clubs were organized that day. We returned very much interested in the new movement.

"Our first step was to organize a boys' agricultural and girls' domestic science club in our school. We knew that it would require work, but we went at it with enthusiasm, and the determination that all should be done entirely outside of school hours, and that our regular work should be kept up to the highest standard. That this has been done is shown by the fact that out of nine applicants for eighth grade diplomas during the three years, only one has failed to pass. (The enrollment in this school varies from 20 to 25). This goes to show that outside interests of the right kind tend to increase and stimulate school interests; thus interest and enthusiasm are aroused and then comes the determination to excel in all things.

"We decided to give a corn and basket social. Every boy and young man in the neighborhood was instructed to watch for red ears of corn and every ear was sent to us. A like number of both white and yellow ears were furnished by the pupils. The husks were stripped back and the ears were tied in clusters of three,—red, white, and yellow and hung all around the walls of the school room. In the meantime the girls were experimenting on brown bread and dyeing corn husks and making mats and baskets of them. A lively two part program was rendered—the

first part bearing on corn and farm life, and culminating in a corn drill and physical culture exercise, during which the children sang the "Corn Song." The second part of the program was miscellaneous. Then followed the auction sale of the corn husk baskets. These baskets were works of ingenuity if not creations of art. During the auction, small boys passed through the crowd with baskets of popcorn balls which they sold at 5 cents each, and small girls carried trays of brown bread which they retailed at five cents per slice. $50.00 was realized from the social and this was sufficient to defray the expenses of ten delegates to Lincoln to attend the State Corn Contest. By this time the entire district was interested, the school board gave us the time, and every patron of the school was ready to lend a helping hand. The girls were furnished recipes and were busy experimenting on brown bread, corn bread, wheat bread, and cake, and corn cob syrup; and the boys were employing themselves along certain lines of manual training. Our work in manual training was confined to making articles of use and ornament about the home.

"Many teachers feel that there is no chance to conduct this work in the rural schools. Of course, the actual work and experiments cannot be successfully carried on in the school room, but the teacher can secure materials and give careful instructions in every detail, and then request the children to perform the experiments in their own homes, and give detailed reports of their success or failure.

"In school-gardening, I first interested my pupils in the common little wild flowers, and this is my plan: The children are shown a flower and told its name and the names *petals* and *corolla*, and given an interesting little talk about those two parts of the flower. Each child is then given one of those particular blossoms to wear, with the instructions that every time they see it on themselves or anyone else, they are to think those names. The next day everyone can tell you all about them. They are then given a new flower and they point out the parts which they have already learned, and they are given the names *sepals* and *calyx* and the name of the flower. They are told that the sepals are little green seats on which the petals sit; that these little petals are very sociable and friendly, so they like to sit close together, and they draw their chairs up in a nice little circle called a calyx. (Suppose we have a wild rose, we say, 'See how they

spread their pretty pink dresses out over their chairs.' Then we tell them that when one of the little petals leaves its seat it can never come back.)

"Each day they are given new flowers and additional information as to its parts. After its organs and their functions have been developed, we tell of the pollen and the good work of the bees, butterflies, and other insects in distributing it, and they watch the bee to see the dust on its legs and its hip-pockets filled with pollen. They then catch the significance of the pollenization of our orchards and thus a great field is opened. Do the children love it? Just try it! We tell them about the corn silk and tassel and how the wind shakes down the pollen, and at that season of the year just watch and listen how interested they are in whether the wind is doing its work, the effect of the rain, etc.

"The children were now so interested that they wanted a school garden. Some teachers have failed in this work because of a mistake in introducing the work. *To announce that the school will have a school-garden and then attempt to create interest in it afterward, is a mistake quite often made.* This means working under difficulties. The children should first become interested in the plant and how it grows. This will materially lead to the desire to cause it to grow where its development may be watched and where results will be a source of enjoyment.

"I first formulated plans, which were then laid before the pupils for suggestion, modifications, etc. We decided to utilize the means at hand. Our school house is situated near a stream, therefore, an abundance of rocks and small stones was available. At noon the boys took the teacher's buggy and gathered up and hauled in enough stones to make borders for six rock beds. With the same vehicle they brought soil from a neighboring corn field, and our school stables and chip yard furnished the necessary fertilizer. Six beds were then constructed in the front yard. Seed was secured by the children each contributing five cents, and some seed was brought from their homes. Over a score of rose bushes were planted, likewise lilacs, lilies, yuccas, flags, etc. In the seed purchased we endeavored to get free bloomers, and among our selections were nasturtiums, balsams, sweet peas, alyssum, ragged robins, verbenas, and zenias. Beds were made under the windows and planted to wild cucumbers and Japanese

morning glories. The cob house was over-run with the same vines. One rock bed was given to the girls of the first, second and third grades, to be their special care. They raised a profusion of tame Johnny-jump-ups and sweet violets. Another rock bed was given to the boys of the same grades, which they planted wholly to chrysanthemums. The children carried water for the shrubs, weeded and cultivated the flower beds, and certain ones were appointed to attend them during the summer months. A profusion of blossoms was the result.

"When school re-opened in September we were greeted by a profusion of flowers, and the morning glories were peeping in at the windows. The children liked to talk about how the morning glories were peeping in to see what the boys and girls were doing inside. Sometimes the children would gather before the recitation for a few moments' talk about the flowers. One morning a bee was captured in a morning glory and dissected, to see how it carried its honey, and everybody found out all he could about bees.

"Some spiders spun their gossamer webs and made their homes among the vines, and we all studied spiders. The children found several tiny brown balloons suspended from the vines; these were filled with little eggs. Soon these eggs were transformed into hundreds of wee dark spiders, and the boys and girls were astonished to learn that these little creatures not only preyed upon each other, but even ate their own mothers.

"Thus school-gardening opened up an unlimited field for the study of bugs, worms, and all sorts of insects. Birds were studied in the same connection. This gives a few phases of the educational value of the work.

"Industrial work does much towards improving the moral atmosphere of the school; the child who is interested in some kind of industrial work will have his spare time and attention fully occupied, and occupied in a healthful way, and will have little opportunity for the development of vice or mischief. Many teachers have expressed their gratification over the refining influences resulting from this work. Nor does it stop here. The enthusiasm engendered by this outside work spreads to all the regular school work, makes it a connected series, and arouses an interest not otherwise to be obtained. We are giving them practical education, fitting the boys to be better farmers and

better business men and the girls to be efficient home makers, and are thus laying the foundations for better and happier homes.

"This supplementary work when properly handled not only makes the regular work of the school stronger and induces more boys and girls to remain in the rural school until they have completed the eighth grade work, but it creates in them the unquenchable desire to know more things and to excel in doing more things. As a result, we find more of such eighth-grade graduates continuing work in high schools and colleges. A genuine love for work comes from learning to do a few things well, makes a better citizen of the child who must drop out of school at an early age, and for others provides a proper foundation coupled with an increased desire for higher education.

"The success of our efforts created universal interest and enthusiasm. In fact, one member of the school board remarked that he did not know whether so much enthusiasm was a good thing or not, as he could not keep his children at home, no matter what the weather, and anyway it would be hard for the next teacher to keep up such an interest.

"As these rock beds are a permanent feature, it will be easy to do the gardening the following spring. The greater value of the school-garden comes in the interest aroused in plant culture which induces the pupil to have a home garden, or assist with a better spirit and with a better understanding the work of the home which relates to vegetable gardening, flower culture, and agricultural work in general.

"Our pupils sent their addresses to the state manager who had a supply of the government free distribution seeds mailed to them. They were interested in planting these seeds, not only those of common vegetables and flowers, but a keen interest was taken in some plants which were heretofore unknown to them. Ochra and spinach were among the first received. The pupils learned all they could about these plants, how to grow them, and how to prepare them for use. Especial interest was taken in the girls in flower culture in their homes, the boys taking more interest in corn, potatoes, and other farm crops. Some excellent collections of grains and grasses were made by the school.

"Now a word to the teachers. Do not undertake school gardening unless you are willing to work—and work hard. On you wholly depends its success or failure. Be willing to take the

initiative and keep it. Seize the spade or hoe and work until your back aches and your hands are blistered, and your pupils will quarrel for their turn, as mine did when we were short of tools As the spirit of the teacher, such will be the spirit of the school.

"To briefly sum up the results of bringing into our school these various interests: First, it brought about a decided interest in regular school work, as is shown by our pupils successfully passing the county eighth grade examinations. The school board last year provided for district eighth grade graduating exercises. Second, after becoming interested in this work we had very few cases of absence or tardiness. Third, the older boys endeavored to get into school as early as possible in the fall and left in the spring with reluctance. Fourth, all pupils studied at home. Fifth, the school board showed their appreciation in a substantial way by giving their teacher an increase of $10 per month in salary for the following year.

"For two years, District No. 20 was the only school in Pawnee county to take an interest in this work. Last fall Pawnee county held its first corn contest, and 43 of the 79 school districts in the county brought exhibits, showing how rapidly the interest is spreading. Corn contests are being held all over the State, and we find just as much enthusiasm and success among the sparsely settled regions as we do in the more thickly settled portions of the state.

"Ours is an agricultural State, and by instructing the children along agricultural and domestic science lines we are not only educating them for the making of better homes, but we are laying a foundation for better higher education and for the making of happy, contented, intelligent citizenship."

PRACTICAL NATURE-STUDY IN THE GRADES

By ANNA E. CALDWELL

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Nature-study, as you all know, is one of the newer fads in education. In fact, all the world seems to have suddenly gone nature-study mad, and we have books and books. We read Thompson-Seton with delight. We are aroused at the startling intelligence of animals. We weep over Loba and laugh over Little Johnnie; and then, Presto! John Burroughs comes along

and tells us it is not true. What shall we believe? Let us stick to the old, old axiom: "Seeing is believing." We can be pretty nearly sure that what we see is at least near being so.

But to return to my subject. First, let us not be misled as to the aim of the study: To cultivate observation and expression yes, and also to strengthen the imagination. We will get far less out of it if we fall short there. Actual knowledge should be acquired. Facts learned. Love for nature instilled. Here, as elsewhere my favorite text appears—one which I should like to have every teacher engrave on the walls of her memory: "Know what you are going to teach *and* know when you have taught it." *Know* what you are going to teach. Do not think: "We will have a nature-study lesson today." Say: "I am going to study the frog today. There things I will teach"; and so lead the discussion that these things are brought out in the strongest possible manner.

So much for the object of the lessons in nature-study. Now as to the material to be used. Here is where we so often fall short. It is like the sailor shipwrecked in mid-ocean,—"Water, water everywhere, and not a drop to drink." Everything about one for study and nothing to use. My advice, and I wish to make it strong and urgent, is to use the things at hand; do not consider anything too trivial. No locality is too poor for good nature-study work; and right here in the selection of material is where we make such dire failures, and is, I think, what is accountable for so much wishy-washy nature-work. Here is a school-house located in a block where there is a grove of trees; the teacher in her spring study of animals talks about bears and wolves and mountains and oceans. Here is a school-house located five miles from a drop of water and the teacher, following some good (and I use the word advisedly) nature-study outline, studies muskrats and beavers and sand pipers.

This is where we err, by following *any* outlined nature-study manual. A man in New York cannot write a text on nature-study which will fit the teacher in Iowa. We must study our environment and our children. What are the children to be? Are they to be farmers? Then study the things which will help them to be good, intelligent farmers, the best possible. Show them the kinds of soil, what it produces, its composition, etc. Are they to live in cities? Then show them the benefits of pure air, of

ventilation, of beautiful skies, of buds, trees and grasses. My only advice on the line of material is, use what is at hand. But do not for a moment think I mean haphazard, misguided study. I mean that the work should be well planned, well arranged, thoroughly studied and then excellently taught. Use plenty of standard texts on the subject for reference. Go to magazines and collect authentic information. But, instead of using it at random, use it in a systematic organized manner.

I have touched on the matter of material; now I come to the all enveloping topic, "Method." I wish someone would coin another word for that. "Method" sounds so cut and dried, so "This way or your life." But that is the heading for this part of my paper and I will give you a method which I think will prove helpful. Let us suppose that it is summer and you have been assigned to your school for the coming year. In the course of study you see nature-study. It looms up, large and forbidding. What shall you teach, and when and how? Now suppose you try some such plan as this. Let us plan it.

In the first place we must study our time. We cannot study things to any advantage out of their season. Therefore, we must consult two things: our environment and the season. Our school commences in September. Take your list of months: September, October, November, December, January, February, March, April, May. Now we have our months.

I should say, make out your outline for the *entire* year as carefully as you can, as to what each month will bring. Having done this to the best of your ability, set yourself to see that you are informed on the subjects. In your general reading, in your walks, in your drives, notice anything you can find along the line and at once upon your return, *note it down.* In conversation with people who know, if any information comes to you put it in your note-book. You will be astonished to find how facts will pour in upon you. Do not trust to your memory, but add these things to your note-book in the proper place *at once.* You begin in September. You have your work well planned and ready for that month. You know just how much you intend to teach and pretty well how you intend to teach it.

Leave plenty of blank space for the information and fill it in as you are ready, and at the end of the year, you will have a manual of nature-study far more valuable than any to be bought.

I neglected to say anything about the literature to accompany the work. I think each month should have its little memory gem or text and aside from this, in the teacher's outline, each month should have its text. Put some beautiful verse of inspiring thought at the head of your outline and it will relieve you of a great deal of drudgery. It will add joy to your work. Then, if there is any good poem or story about the material you are using read or tell it to the children.

So by the end of the year you will find you have gained wonderfully in your own store of knowledge. You have taught a year's work in nature-study which has been interesting, connected and wholesome. You have inspired the children to further research; and the work has not detracted but added to the interest which the child takes in the world around him. This would be a happy world if each of us knew and loved the place in which he works.

NATURE-STUDY IN THE SECOND GRADE

By ALTA PEACOCK
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The aims of nature-study in the second grade are the same as in a high school or a university class. The aims no less than the final results should be two-fold in character, intellectual and ethical. These are very closely related, and when the child knows and loves the common things of life the teaching has been effective.

The first requirement of nature-study work is that the subject-matter shall lie within the personal experience of the pupil. The next is that sufficient time be given the growing mind that it may have the joy of discovering for itself the causes, effects, relationships and harmony of the processes of nature. Another essential is "Training the pupil to see when he looks." By fixing his attention upon the object he is studying, he acquires not only powers of observation, but what is even more valuable, a habit of concentration. "Make haste slowly" is a maxim which should be constantly before the teacher. Little children must acquire knowledge slowly. The things learned unconsciously are often of greater value and make a more lasting impression than the formal lesson.

Nature-study in most schools has a place in the language work. The pupils of the second grade are eager to see, to learn, to tell, and to write.

Each grade in our city schools studies a certain tree. The tree for the second grade is the cottonwood, perhaps the most common tree in Nebraska. An account of the work done in one particular school with this topic may be interesting.

In the fall the children were taken to one of the parks where there were many cottonwood trees. At that time the trees were gorgeous in their beautiful yellow leaves. All the trees were appreciated, but the cottonwood was the general favorite because the leaves were so bright and had such lustre. The size of the tree impressed most of the children. We took some leaves home with us. Next day we painted the yellow leaves, learned the size, shape, color and veining.

After the leaves had fallen I asked my class to bring in some cottonwood twigs. Nearly every child brought a twig, but not a cottonwood was among them. Next I told them where to find the kind of twigs I wanted. They brought them. We compared these with ten or twelve other varieties of twigs. Then each child drew or painted his cottonwood twig. The buds were larger on the cottonwood than on the other trees. We wanted to see what was inside. Each pupil opened a bud and told what he found. Several times during the winter buds were brought in and opened. One or two were kept each time, so that comparisons might be made.

The first warm days of spring found the children watching the trees to see what changes would occur. The swelling and bursting buds, the red and the green catkins and the new leaves were a source of delight and interest to every child. When the red catkins dropped there was real sorrow, but when the green ones were found still hanging to the trees, the spirits rose again. The interest continued until the seed pods had formed and it was time for the summer vacation.

As the seasons changed I read poems relating to each. In the fall I found the following very good: Helen Hunt's "Down to Sleep," Bryant's "Death of the Flowers," Richard Henry Stoddard's "November," Margaret Eytinge's "Autumn," Mrs. Nicholl's "Indian Summer," W. J. Henderson's "A Song in October."

All this had taken time. We had spent only a few minutes each day but many days elapsed before we could *tell* and *write* what we had seen and learned. The following composition was the result of the efforts of the class. Each paragraph represents the work of several days of nature-study.

"The cottonwood tree grows in nearly every part of the United States. It grows best near the water. In Nebraska it is found near the streams. The Indians used to burn the grass every year and they killed the little trees on the plains. This tree is sometimes eighty feet tall and the largest are fifteen feet around. It is the largest of our native trees. It grows where other trees cannot. It grows quickly.

"The roots of the cottonwood trees are large, long and spreading. They are about as long as the tree is tall. They have lots of work to do. They drink up water and food from the ground. If they did not, the tree would die.

"There are two kinds of cottonwood trees. One belongs to Mr. Cottonwood, the other to Mrs. Cottonwood.[1]

"Last fall Mr. and Mrs. Cottonwood were very busy putting their babies to bed. Each baby was about as large as a pin-head. Each was wrapped in several green blankets. They were inside brown cone-shaped cradles. They were glued in tight. They were told not to wake up until Spring. Mr. Wind rocked the cradles all winter. The babies slept soundly.

"All this time the cottonwood babies were growing. By March 30th they were as large at little worms. The warm sun knocked at the door and said, "Come out and play." The first week in April they kicked off the blankets and cradles and came out. We saw the cradles lying on the ground. Up in Mr. Cottowood's tree there were red tassels or catkins. They were about five inches long. They make the tree look very pretty. When we shook these catkins some yellow dust came out. This was pollen. Mrs. Cottonwood's tree was covered with green tassels. They were smaller than the red ones. The wind took the pollen from the red tassels and gave it to the green ones. Then the green tassels turned into seeds. The seeds looked like green currants. The red tassels are all gone now. The green tassels

[1 Probably the majority of science teachers will critize the use of Mr. and Mrs. in this and the two paragraphs which follow, but such methods have the approval of many excellent teachers of young children.]

R. M.

are going to stay a long time—until the little seeds get ripe. I want to see the ripe seeds.

"The leaves are heart shaped but straight at the base. They are dark green. They are sticky and shiny.

"The wood is soft and white. It is not good for houses or furniture. It is used for crates for fruit. Some people burn cottonwood. I like the cottonwood tree because it grows so fast."

Each child had his painting representing autumn leaves, twigs in the fall and in the spring, green leaves, red catkins and green catkins.

In this grade the child's power to express himself orally far exceeds his power of written expression. In all language work I have insisted upon the oral expression, first by sentence work, then by paragraphs. Not until a pupil can stand and give a paragraph in good English is he ready to write that paragraph.

The element of time must of course be considered. The nature-study with opportunities for individual investigation and for collecting ideas from members of the class affords excellent conditions and opportunities for saving time.

While the nature-study must receive the attention of the class and must be the foremost thought in the mind of the teacher, a certain amount of language work must be done, or the child fails to get adequate expression for his observations and thoughts. The correlation of language and nature-study is unavoidable.

The use of capital letters, marks of punctuation, and paragraphing are learned incidentally. The pupils learn almost unconsciously what makes a paragraph. Much of the required work in language may be accomplished by careful attention to these details when the nature-lesson is in course of preparation.

The work in a second grade must of necessity be of the simplest character. Yet, in making a careful study of any object in nature the pupils are trained to work in harmony with their fellows, to acquire knowledge through original investigation, and to search for the thoughts of good writers.

A COURSE IN NATURE-STUDY FOR TEACHERS

By RUTH MARSHALL
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It has been recently stated that the leaders of the nature-study movement are in practical agreement as to matter and methods. If this is so, it is a great step forward. But to those of us who see how the subject is usually taught—or not taught—how the subject actually lies in the minds of those who are not the leaders but the teachers and the students, the present status of nature-study as a school subject is far from what it should be. The foundations for successful study and teaching are hardly laid.

Nature-study has come to stay. Popular interest in the out-of-doors and the extention of scientific work has forced it into the schools poorly prepared to teach it. When the curriculum has adjusted itself somewhat to the many new demands upon it, conditions for nature-work will be more favorable; but still the great drawback is the lack of preparation of the teachers. Let us face the situation fairly, remembering that neither teachers nor schools are to be blamed for the failures. We are confronted by a situation which is one aspect of changing conditions and shifting points of view.

Nature-study has suffered from too narrow an interpretation of the term. If this were conceded, some of the difficulties about subject-matter and methods would disappear. The discussion as to whether it is the foundation of science, or supplementary to it, or all inclusive of it, is a secondary matter. Let us remember, too, the significance of the term nature-study and that it is not limited by the course of study of the elementary schools.

After all, what is it that we are trying to get as students and teachers, for ourselves, and that which we want the children to have? Forget, if we can, the pedagogics, or keep it well in the background, and lay aside the trite sayings that nature-study trains the process of observation, fosters a love of nature, trains the logical powers, and many of the other things that cumber the subject, the so-called principles which so many school people seem to think essential to place conspicuously at the head of the

course of study, as a kind of thesis to be defended. The thing that we want to get is a knowledge of nature; in schools we want the children to know nature. That is all, and that is enough. But they must really know nature, and we must really know that we know it when we attempt to teach it. Really know nature at first hand and all these other things shall be added,—alertness of observation, love of nature, the power and the logic. This is what the scientist wants, the agriculturist, the ordinary man and woman of every calling, and it is what the children need. It is not an easy thing to get, —the knowledge of nature. Like other knowledge it comes mostly through work and study. If we are interested we forget that the study is hard. So it is with nature-study. It is doubtful if interest in nature and love for it, as we commonly use the terms, are inborn in every child, to be stifled later by some cruel pedagogue. Both in the individual and in the race, the intellectual and aesthetic appreciation of nature have come late. Literary and scientific writings on nature are very modern, most of them. What we often take for love of nature is usually only a transient and superficial curiosity. From the beginning, man has of necessity been in close contact with nature, for he is a part of nature. His rise from savagery has been the result of his conquest over it. But this has been when superficial curiosity has deepened into intelligent interest that has lead to conquest and true knowledge. The aesthetic appreciation comes later. Here and there are those born to it, as there are a few rare souls born to an appreciation of art and music; with most of us it is largely a matter of education. Interest in human nature is greater than interest in nature, and naturally and rightly so. This new movement for the study of nature in the midst of which we are today is not another "return to nature" movement, although it is in some measure the result of the strain of urban life, but a new interest, an interest deeper and more general than ever before. The knowledge of nature that we have in mind is the possession chiefly of the age in which we now live; a large part of it has come very recently to the race. This new knowledge, this new renaissance, has most profoundly changed our entire outlook upon life. The movement for the teaching of nature-study in schools is part of an attempt to adjust the school curriculum to the changed point of view, the putting of emphasis on new things. We cannot too much

emphasize this fact, that the increased knowledge of nature, with all the changes which this has wrought, is the profoundly significant fact of our day.

It is time when we are taking stock; let us take stock of ourselves, and see what equipment we have, what resources the school may draw upon for the teaching of nature. The equipment is very meagre, and we must realize it. This is primarily what stands in the way of success. People who live in the country surrounded by nature often have the most cramped and limited knowledge of it; only that which immediately concerns their occupations, that which necessity like a hard master has driven them to acquire. They are not wise in the ways of nature and they have not the culture and power which it gives. In towns there may be a little more, or a little less of this nature culture. The ordinary citizen does not know the names, even, of the trees about him, nor the birds, and of course little of their economic relations. The children go through the elementary schools, and through the high school, may "take" botany and zoology, and not know the blue jay nor the butter-cup that grows like a weed about them. These are facts, not criticisms. What can teachers, coming from the country and towns and educated in these schools, do more or know more? That they are going to know more and do more, and that they are making a praiseworthy effort is shown by the difference in the amount of nature lore and consequent interest in nature which school children have now as compared with children twenty years ago. Both schools and communities are shifting their points of view and catching the new spirit.

What is the condition of those more favored students and teachers who have had opportunities to get the nature culture in higher institutions? We are looking to them, and rightly, for leadership and light. Most improvements in school matters come down from above. Here again, let us take stock. The great majority of students enter college with a very meager fund of nature lore. The so-called courses in biological sciences in high schools have been rather unsatisfactory, largely because there has not been a foundation of nature-study of any sort. In college, the students have more of the same kind of work, better perhaps, more intensive, but still largely ineffective, because the foundation of nature lore is not there. The instructor

has it, but he cannot realize the students' position, or assumes no responsibility for it. They study type plants, type animals, are given principles and hear a discussion of evolutionary problems. And all the while the trouble is, they have such a meager outfit of facts from which to generalize. One cannot be a scientist who is not a naturalist. It is very instructive (at least to the instructor) to watch a class of students or teachers out upon a field trip, and see how lost they are in the world of nature about them. Perhaps the instructor will be saved from an over-critical attitude by discovering that even he is barely on speaking terms with very common forms. Let it be understood that this is not criticism, but an attempt to state the situation clearly. Those who are to teach nature-study must know nature. At present the lack of knowledge sufficient to teach successfully is very great. This great defect is going to be removed. But it is going to take time and skill. A great responsibility rests on institutions for training teachers. The success of the movement lies largely with them. We must be patient to wait; let there be time for nature culture to reach down into the schools and communities.

A tentative effort to frame a course in nature-study for teachers was made in the University of Nebraska and offered in the winter and spring of 1908 for students preparing to go into the work of teaching. The same course was given in the summer school following. The work consisted of two lectures a week for one semester with from two to four hours on Saturdays for field, laboratory or museum work. The subject-matter was the common plants and animals of the regions in their life histories and relations to man, with directions for collecting, keeping and studying them, together with methods for presenting the subject in schools and a discussion of the literature of nature-study.

The lectures began with a discussion of the meaning of nature-study, its scope and its aims in elementary schools; and then followed definite subjects in the order which seemed best adapted to the aims of the course and the season of the year. The attempt was made to give such informational matter as would help the students to make up their own deficiencies and put them in position to gain more knowledge for themselves. Emphasis was put on those phases of the subjects best adapted for elementary schools, and practical suggestions were given for presenting

the subjects to children. Students kept note-books in which were outlines of the lectures and notes on field and museum work. The first subjects were domesticated animals, the common trees and the common birds. Before field work became practicable, the University collection of birds and the herbarium specimens of trees were examined. Field trips were made to several points to familiarize the students with the material to be obtained all about them; the attempt was made to have some definite object for each trip. A herbarium collection of twenty-five trees, and a list of fifty birds identified was required. (The last list had to be cut down.)

Before field work was begun, each student made an aquarium (the frames furnished by a tinner), after the models in Hodge's "Nature-study and Life." The stocking and keeping of the aquaria constituted part of the work during the course. When the subject of insects was reached, students began to make collections representing the chief orders, and a few were mounted in frames between glass. Opportunity was lacking for the carrying out of all the work on insect rearing which was planned; this was more successfully carried out in the summer course. Then followed the subjects of some common flowering plants and common plant families, weeds, and a little time for flowerless plants. Other subjects were the toad and the earthworm; here again much of the observational work planned could not be carried out. Frogs' eggs were collected by every student, and the developing tadpoles kept in the aquaria under observation until the end of the course. The summer class found and kept the tadpoles.

From time to time, reports were made upon assigned readings. These included White's "Selborne," Thoreau's "Walden," Burrough's "Wake Robin," and short selections from a few of the prominent recent writers, including some of the so-called "nature fakers." An attempt was made to lead the student to see what consitutes good nature literature, and its place in the elementary school. Each student, moreover, made at least one visit to an elementary school to observe some nature lessons. And finally, there was an examination of the courses in nature-study of several cities, and the framing of a course of study by the students themselves suited to local conditions.

In the limited time and with limited facilities, the amount of work was necessarily limited and the work elementary. Physical nature-study was not included. Few courses for college students have yet been worked out to serve as a guide. Experience seems to show that until elementary and secondary schools can teach more nature-study, the subject-matter for preparing teachers must necessarily be very elementary. However, something was accomplished, and the experience is given in the hope that it may make a small contribution to the discussion of courses for teachers of nature-study

DEPARTMENT OF SCHOOL AGRICULTURE

Conducted by BENJAMIN M. DAVIS

[All communications concerning this department should be addressed to Professor Benjamin M. Davis, Miami University, Oxford, O.]

AGRICULTURE IN ELEMENTARY SCHOOLS

By CHARLES S. BUNGER
Township Superintendent, Lewisburg, Ohio

Agricultural education has been shaping and taking form for more than a century. The first agricultural associations were organized about 1785, and, as a result of the agitation of these associations, colleges began in 1792 to provide for such instruction. Columbia College took the lead, and Harvard, Yale, and other leading colleges soon followed.

The present system includes university courses of instruction; general college courses; schools of special subjects as dairying, animal husbandry, field crops, etc.; agricultural extension; agricultural high schools; and elementary instruction in common schools. All these, except the last, have efficient organization and are doing splendid work. In the elementary schools work in agriculture has not, as yet, taken definite form. There are many theories as to how it may be brought about. It is also difficult to say just what may be included in elementary agriculture. Some would restrict it to instruction in agriculture as such, while others would include everything that pertains to agriculture, such as nature-study, botany, physical geography, in fact any work that can in any manner be related to the subject. In many States the subject of agriculture may be taught, while in others laws require teachers to be examined in agriculture and the subject to be

taught in the elementary schools. Especially is this true in the South and West. There are now thirteen States having such requirements.

Almost every school has some form of nature-study whether clearly outlined or not. The general idea is that, if properly pursued, it paves the way for systematic agricultural work in later years. If children are rightly directed, they may be lead to see the economic value of many things in nature that otherwise would never be appreciated. The question of school-gardens has also brought forth different views. Some hold that they are only helpful in cities where children have no first hand access to nature. Almost all of our large cities have come to recognize their value, and in several cities gardens have been in existence for several years, e. g., Cleveland, New York, Boston, Philadelphia, Chicago, and San Francisco.

Opinions vary as to the value of school-gardens in rural schools. It is argued by some that country boys and girls have ample opportunity for such training and that it will not pay. It is held by others, that, while it may not be worth while from the same standpoint as with city children the school garden may be even greater service to the children of rural communities. Here "the function of the school-garden is not to give new experiences and illustrations, but rather to help make the child's environment more significant to him."

Where interest is properly worked up children have been willing to take turns in caring for the gardens during summer, and when school opens in the fall material is at hand for study from a very different standpoint than at home where only money or food value is considered. In this respect a change in sentiment in the neighborhood may be necessary before much can be accomplished. But teachers find that if this phase of work is rightly approached, much interest can be awakened, and that, after all, many country children do not know much about the real nature and requirements of the very plants they are so familiar with. When they examine a common plant from the garden or germination box, at school, they are looking from a new viewpoint, and a surprising amount of interest is awakened. Perhaps the best features of this work are planting flowers, shrubs and trees with the view of beautifying the grounds and cultivating a desire to preserve trees and shrubs. The transformation of unsightly

school grounds into a place of beauty is sufficient justification for such work in rural schools. It may also help dispel the idea that any place will do for a school, and may help also in creating a community pride in the school grounds.

Concerning elementary agriculture opinions as well as plans are widely different. In many schools, as has been said, it is a required subject. Texts are adopted, a place is made in the program, and classes are formed. Frequently the text is followed in detail and studied as are many other things, with little attention paid to the real subject as it might be presented, if its possibilities were really comprehended.

It is the observation of the majority of school men that teachers do not feel prepared to present the subject other than to follow the text, and that it thus simply adds to the already crowded course of study.

At present, one of the most satisfactory plans followed is the use of bulletins and pamphlets sent out by the agricultural extension departments of universities and colleges. These publications are full of suggestions that may be carried out and yet not necessarily add to the number of studies in the course. Boys' clubs are organized, and actual work is done in the summer vacation that gives the boys insight into methods of cultivation, kinds of soil, methods of treating the soil, best means of caring for crops, etc. Competition is encouraged by prizes, and the older members of such communities where this work is done are aroused and take new interest in the possibilities of careful methods of cultivation and seed selection.

The best work is being done in those country schools where soil and plant life are studied incidentally with nature-study, geography and kindred subjects. No place can have more ideal conditions for such work than the country district. Everything needful is to be found first hand, and bulletins suggest many helpful and profitable experiments that may be performed at practically no expense. Many teachers are solving the problem of handling schools at noon and recess periods during bad weather by exciting interest in such experiments.

Agricultural instruction in the country schools is a problem that is not yet solved and cannot be solved by the teacher alone. But it is not left entirely to the teacher to work without aid. There is an increasing demand being made by the people for such

instruction and provision is being made to prepare teachers for such work. In townships having high schools, much of the work is reserved for the high school. In a recent report made by Professor A. B. Graham it was shown that in Ohio, seventy-three high schools have agriculture as a regular branch in the course of study, and one hundred and fortyseven correlate the subject with botany, physics and physical geography. It is generally conceded that the best work cannot be done in rural schools under existing conditions. If so, these conditions must be readjusted. Where schools have been consolidated good results have been secured, and this may be one of the best solutions for the problem for in such schools it is easier to secure teachers with some preparation for teaching the subject. The demand is upon the schools. If consolidation and employment of teachers trained for the work are the necessary conditions the people and teachers will ultimately meet these conditions.

The time has evidently come when the farm with its opportunities are being realized, and the possibilities and advantages of rural life must be enhanced by proper education of the boys and girls of rural communities.

A NORMAL SCHOOL STUDENT'S GARDEN REPORT

By MARY F. BARTLETT
Instructor in Plant Nature-Study, Montclair, N. J., State Normal School

The problem assigned was the determination of the relative values for school-gardens of the vicinity of certain varieties of garden peas. All details were left to the student and the work was carried on at her home in Caldwell, N. J. The report is submitted as it was handed in.

Garden Report by Alice C. Lewis

Peas

I. *Varieties:* 1. American Wonder, dealer Vick; 2. Prosperity, dealer Vick; 3. Excelsior (Nott's), dealer Vick; 4. Little Gem, dealer Henderson; 5. New Surprise, dealer Vick; 6. Vick's Selected, dealer Vick; 7. Thomas Laxton, dealer Vick.

II. *Date of planting:* On May 6, 1909, there were planted in seven separate rows the varieties of peas named above.

III. *Method:* After preparing the soil with fertilizer, seven trenches were dug which were one foot deep. The peas were placed about one inch apart at the bottom of the trenches. One inch of earth was placed over the peas. As the peas grew the trenches were filled in with soil until the garden was level.

IV. *Observations:*

Varieties	Appearance	Growth on May 18	Date of full growth	Height	Support	Appearance of Flowers	No. Peas in Pod	Date of Maturity
American Wonder	May 15, '09	1 inch	About June 15	6–10 inches		June 12	4–6	June 26, 1909
Prosperity	May 15, '09	2–3 inches	" " 14	2 ½–3 ft.	brushing	June 8	6–8	June 24, 1909
Excelsior	May 14, '09	2–3 inches	" " 19	1 ft.		June 12	6–7	June 29, 1909
Little Gem	May 15, '09	1–1 ½ inches	" " 20	9 inches		June 15	2–6	June 27, 1909
New Surprise	May 14, '09	2–3 inches	" " 18	3–3 ½ ft.	brushing	June 14	4–7	July 1, 1909
Vick's Selected	May 14, '09	3–3 ½ inches	" " 18	3–3 ½ ft.	brushing	June 8	6–7	June 25, 1909
Thomas Laxton	May 15, '09	½–3 inch	" " 20	2–3 ft.	brushing	June 12	6–8	June 28, 1909

V. *Results and remarks:* The foliage of the American Wonder vines is closely set and compact. The color of the leaves is dark green. Very few matured, and the ones which did were at one end of the row. A definite conclusion, therefore, cannot be recorded; The prosperity peas are early and of fine growth. The plants are healthy, upheld by thick stems. The pods are large and filled with peas; The Excelsior pea is a small plant containing many leaves. The stem is large and tough. In comparison with Vick's selected the quantity of Excelsior peas for the same space was smaller; The Little Gem, a dwarf pea yields a small pod but well filled. The plants are rugged and of a dark green color. The New Surprise is a late pea yielding plentifully but slowly. The foliage on the vines is scattered and light green. The vines are awkward, requiring aid to stand even by the brushes. They seem to prefer the ground; The Vick's Selected, another early pea, with easy climbing vines, is a kind which yields more peas for the same plot of ground than either the Thomas Lawson or Excelsior. Contrary to the statements in the catalogue, I found the pods large, but the peas comparatively small for such a sized pod. The vines grow rank and healthy, and were easy climbers. The foliage is closely set and the stem slender.

VI. *Conclusion:* If I were selecting peas for a school-garden I would consider the time taken in the growth, and abundance of the crop. Since schools close about the last week in June, from the above varieties I would select the Prosperity or Vick's Selected as they mature the earliest of any under consideration. Of the dwarf peas I would select the Little Gem.

AMERICAN NATURE-STUDY SOCIETY

Nominations for Officers, 1910. The Council, acting under the authority conferred by the constitution of the Society, has made the following nomination for officers to be elected at the annual meeting to be held in Boston on January 1, 1910 at close of meeting for reading of papers. Members who do not plan to go to Boston may mail their ballots to the Secretary at 525 W. 120th St., New York City, before December 15. No printed ballots will be issued this year. Seal ballots in envelopes marked "For Officers, 1910."

For president—O. W. Caldwell, (Ill.).

For vice-presidents (vote for five)—S. Coulter, (Ind.); B. M. Davis, (O.); H. W. Fairbanks, (Cal.); C. R. Mann, (Ill.); D. J. Crosby, (D. C.); M. F. Guyer, (O).); F. L. Stevens, (N. C.).

For directors (vote for five)—L. S. Hawkins, (N. Y.); C. H. Robison, (N. J.); Delia Griffin, (Vt.); S. Schmucker, (Pa.); C. F. Hodge, (Mass.); L. H. Bailey, (N. Y.) J. G. Coulter, (Ill.).

For directing editor to be elected if council decides to divide work of secretary and editor—F. L. Holtz, (N. Y.)

For secretary-treasurer—F. L. Charles, (Ill.).

Committee on Nature-Study in Normal Schools. The council has appointed the following committee in accordance with vote at Baltimore meeting: C. H. Robison, (N. J.), *chairman;* H. N. Loomis, (Conn.); E. R. Downing, (Mich.); J. A. Drushel, (Mo.); S. B. McCready, (Ont.); R. O. Johnson, (Cal.).

Annual Meeting. This will be held in Boston on Saturday, January 1, from 9 to 1 o'clock. The topic for discussion will be the course in nature-study for elementary schools. The annual business meeting will be held at 9 A. M., and the reading of papers will begin promptly at 9:30. The place of meeting will be announced in the program to be issued by the American Associations for the Advancement of Science.

BOOK NOTES

Practical Guide to the Wild Flowers and Fruits. By George L. Walton. Philadelphia: Lippincott. 1909. $1.50. This guide to the common wild flowers (about 400 species) and the conspicuous fruits (about 100 species) follows the now popular method of grouping by color. The ingenious diagram keys here used for each color group are a great improvement upon all earlier books, not only because they enable one to arrive more quickly at the plant names, but because they form a very easy introduction to botanical keys in general. That the keys may be usable by those who know little of botanical terms—even by children—a very simple glossary is given, the flower descriptions are in very clear, non-technical language, and the keys are so framed that the correct names may be reached even by those who call the large white bracts of the dogwood, "*petals*," or the spathe of the Jack-in-the-Pulpit, a "*calyx*."

Teachers College, JEAN BROADHURST.
Columbia University.

Descriptive Astronomy. By H. A. Howe. New York: Silver, Burdette & Co. Pp. 342, with star maps and illustrations. This is intended for use as an elementary text-book but will be useful for general readers and for teachers of nature-study who give lessons on the heavens. The first edition was published thirteen years ago.

The Nature-Study Idea. By L. H. Bailey. New York: Macmillan Co. 1909. $1.25. A revision of the famous book, which was issued by another publishing house in 1903. We hope to publish a review later.

Elementary Principles of Agriculture. By A. M. Ferguson and L. L. Lewis. 1909 Sherman, Texas. Ferguson Pub. Co. This is a new edition of a book which has met with very cordial reception. It is an excellent statement of principles and wisely omits long descriptions of farm practice such as most pupils already know from experience. In short, the book is science applied to the principles of agriculture.

THE
NATURE-STUDY REVIEW
DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS
Vol. 5 NOVEMBER, 1909 No. 8

NATURE-STUDY IN CITY SUBURBS

By F. L. HOLTZ

Report of a committee of the New York City Section of the American Nature-Study Society, F. L. Holtz, of Brooklyn Training School for Teachers, chairman.

The committee to consider the revision of the syllabus in nature-study for the outer districts of this city bases its report upon certain general considerations:

It is a far cry from the nature-study environment of the lower East Side to the rural scenes of Richmond, Queens, and the Bronx. Obviously the children of these two sections must have diverse interests in nature. Nature-study, pre-eminently, should be adapted to the child's environment, that it may be upon an observational basis and that it may find a logical application in the child's life. One and the same course of nature-study cannot serve the children of the paved tenement quarters and the rural or semi-rural sections of our city.

The teachers of nature-study have to depend upon themselves, chiefly, for illustrative material. They should have the liberty and convenience to gather this material in their school locality. Since regions differ greatly as to the kind and abundance of material, the teachers should be given considerable latitude as to the use of suitable substitutes for the prescribed kinds of illustrations. The success of a nature lesson depends very much upon the interest and enthusiasm of the teacher. It stands to reason that she can do better with easily obtainable and observable material, for which the pupils have some apperceptive basis, than with material on which she has to waste her enthusiasm in the mere getting and which is foreign to the children.

It is not intended to intimate that material should never be chosen from outside of the child's immediate environment.

Much of the esthetic and ethical value of nature-study lies in the study of flowers, birds, etc. The child of the congested districts should be given a chance to enjoy these. But as a general rule, that which lies close at hand is better for nature-study purposes.

A consideration of the present nature-study syllabus for New York City shows that it is primarily adapted to the suburban and semi-rural parts of the city, and not to the interior, except in such special localities as where schools are situated near large parks. The illustrative material required by the present syllabus is not such as exists in the environment of the great bulk of the 600,000 school children of this city.

The great criticism of most nature-study courses, including our own, is that they are unrelated to the other school studies and are disjointed within themselves. Perhaps the greatest progress made in organizing nature-study is in correlating it with geography, as illustrated by Fairbanks, McMurry and others. This correlation is most natural, and pedagogically desirable. The two subjects should go hand in hand. The course in New York City could be much improved along this line, by including more industrial nature-study and some physical nature-study in the fourth, fifth and sixth grades. The experimental culture of commercial plants in the school-garden would be an excellent thing. There is some such correlation with geography in the present syllabus, but it should be extended.

Again the present course provides for hardly any correlation of nature-study with domestic science and manual training. Both of these subjects would have their intellectual content enriched and the nature-study would find in them a logical and practical application. The study of the properties of different kinds of woods, and other construction material, the study of fibres, the use of the school-garden products in cooking—are suggestions for correlations of this sort.

If any form of nature-study is practical and of daily application, it is the study of our own bodies and how to take care of them. At present in this city, physiology and hygiene are almost in a state of "innocuous desuetude." If correlation should exist between any subjects, it should between nature-study and physiology and hygiene. The former should be basic to the latter. Many topics, such as respiration, ventilation, etc., should be based upon nature-study. Experiments on plant life

phenomena may to a certain extent illustrate similar processes in man. We plead for a resuscitation of the physiology and hygiene, and believe it can be done by connecting it more intimately with nature-study and by employing the same methods of teaching it as for nature-study.

It is to be deplored that there is a break in the course of nature-study, and a loss of perhaps the best opportunity to interest children in the larger problems and relations of plants and animals, in the absence of all nature-study in the sixth year. This is a year of intensive geography, when some very practical correlation could be carried on between it and nature-study.

Considering the possibility of applying numerous facts of physical nature-study in the lower grades in connection with geography, physiology, plant and animal lessons, manual training and domestic science, it seems very desirable to introduce some lessons of physical science, or elementary science, into these grades. A little of this is done in the first three years. Why not do more of it in other grades?

School-gardening has demonstrated its valuable possibilities and has been found to be a useful adjunct to the other school activities. Gardening is distinctively an opportunity for the districts covered by this committee. It should be encouraged and supported wherever feasible. This includes window gardening, and as such has a still wider application. As an outdoor laboratory, as a place for observing the growth of plants, the effects of soil, weather, weeds, insects, etc., the outdoor garden is of great value. It could furnish much material for indoor nature lessons. This connection between gardening and the regular nature-study should not be overlooked in the excitement and interest of making the garden. The school-garden is a means rather than an end in itself. The syllabus should contain specific directions for making gardens and for organizing the work; and should indicate suitable seeds, plants, etc.

The syllabus should be more than a mere enumeration of topics. It should contain not only sub-topics, but also suggestions for point of view, emphasis, applications, experiments, illustrative material, and it should contain numerous hints on method. Without these suggestions the topics are taught more or less alike, without reference to their specific needs or aspects. The present syllabus has an introductory page with hints of this

kind, and a few experiments are indicated, and some sub-topics are given. But this is altogether too meagre for teachers not very familiar with the subject-matter to realize its possibilities and applications. This sort of treatment of the syllabus would make it longer, but results would more than warrant the extension.

In the nature-syllabi of some other cities, and of many normal schools, such explanatory and suggestive hints are included. There are even typical lessons and outlines of subjects. We believe that with such a syllabus the teaching of nature-study would be greatly improved.

Another suggestion is that the topics of the syllabus be arranged more according to the seasons, perhaps by months. At present we have the topics for the fall term and the spring term. But the topics are not properly distributed according to the seasons, and we often find teachers teaching about blue-birds and butterflies in snow time, and other topics similarly out of place. Teachers are prone to follow the syllabus closely and an approximate arrangement of the topics according to the seasons would lead to improvement.

It would also be helpful to teachers if sources of materials, helps, etc., were suggested in the syllabus—such as what to collect, where to collect material, where biological supplies, etc., may be purchased, where seeds and bulbs may be got, the assistance rendered to schools by museums and other institutions. Also a list of the commoner reference books for the various topics would be very helpful.

With these general considerations in mind, the committee to consider the nature-study syllabus for suburban and semi-rural sections of New York City, report as follows:

1. The course of study in nature-study is adapted to the environment of the schools in the sections specified, and seems fairly well suited to accomplish its purpose.

2. The syllabus in nature-study is fairly well adapted to the environment of the schools.

3. The syllabus should provide for greater latitude in the use of substitutes, which should be indicated.

4. The syllabus should be arranged more according to the seasons, preferably by months.

5. The topics of the fourth year particularly need revision. The topics at present are difficult to teach and are more or less

repulsive. For this reason they should not be grouped together, but should be distributed in other years.

If more correlation is attempted, considerable shifting of other topics will be necessary.

6. The syllabus should be revised so as to provide better for correlation with geography, physiology and hygiene, manual training and domestic economy.

7. Provision should be made for nature-study in the sixth year.

8. More physical nature-study should be taught in years below the seventh.

9. School-gardening should be provided for in the syllabus.

10. The syllabus should contain more suggestions on method, treatment, illustrative material, experiments, etc., and should contain common references on the chief topics.

11. Practical suggestions should be included in the syllabus concerning material, collecting places, other sources of supplies, aids given by museums and other institutions, etc.

NATURE-STUDY IN CONGESTED CITY DISTRICTS

By EMMA SYLVESTER

Report of a committee to the New York City Section of the American Nature-Study Society, Emma Sylvester, Principal of P. S. 35, chairman.

A large number of reports from teachers, assistant principals and principals of schools located chiefly in congested districts of New York City, forms the basis of the following report.

The material seems to fall naturally into the following divisions: (1) A general review of the nature-study movement, its aims, and how these are to be realized. (2) The course of study in New York City, with special reference to congested districts. How do our results compare with the aims referred to above? (3) Suggestions for making the course better fitted to needs in crowded districts.

Educational aims and ideals have, in the past, undergone many a change; but in spite of this fact, they are still in process of development and constant readjustment. In "The Meaning of Education," Dr. Nicholas Murray Butler lays stress on what may be called the child's "intellectual inheritances," and he says in effect, that the aim of education is to place the child in possession

of these "inheritances." Dr. Maxwell, (superintendent of schools, New York City), holds a similar view, expressed in his excellent article on "The American Teacher." More recently, emphasis has been placed on what is termed "fitting the child for his environment." This view is set forth by Professor Bailey, of Cornell University, and Professor Hodge of Clark University. At present, prominent educators are advocating the need of a more practical sort of training—vocational training.

It is true that, to a greater or less degree, we have lost sight of the child's present life in our efforts to fit him for his future. Too great importance has been given to the *matter* to be taught, and too little attention given to the *child*. It is fortunate, however, that the present trend of pedagogy is toward a training closely related to the child in his present life and surroundings.

It is a principle as old as Comenius that education should begin with what is near at hand and proceed gradually to the more remote. It must be confessed that much of our work is not connected closely enough with the conditions in which our pupils live. Professor F. L. Charles (De Kalb, Ill., State Normal School), says on this point: "It is a very suggestive fact that we seem to interest ourselves first in those things that are afar off, and only come back later to those which lie close at hand. We are beginning to realize more and more that a very large and important part of our education comes from contact with things in our immediate surroundings, commonplace as they may seem."

Nature-study is an outgrowth of the effort to place pupils in contact and sympathy with their own surroundings. Bailey says: "It is strange that the nature-study movement should have been needed at all. It seems almost inevitable that education should place children in relation with the objects and events in which they live. It is true nevertheless that our teaching has been largely extraneous."

One authority after another voices the same thought.

There is another point upon which all authorities agree—the work in nature-study should be *practical*. "What are the proper subjects for study?" is often asked. Bailey answers again, "That which is commonest to the child; that which can be most easily seen and appreciated,—that which is nearest and dearest to him. The tendency has been to go too far afield." The very

object of the study is defeated if we force the child to study things in which he has no interest.

The great purpose of nature-study is to give the child a simple, observational knowledge of the *objects* by *which he is surrounded*, so as to place him in harmony and in sympathy with his environment, and with the forces at work about him. In our elementary work in the lower grades, we should not aim to arrange these facts with reference to any special branch of science, but we should seek to adapt the work to the needs and capacities of our pupils.

What then, is nature-study? "It is not science, not knowledge, not fact—it is attitude, spirit, a point of view, a means of contact with things about us." The difference is largely one of spirit toward the work, in other words, rather than of subject-matter. When teachers fully appreciate and understand this, our work will gain a hundred fold in value.

Every educational problem presents certain difficulties peculiar to itself. There is, perhaps, no subject in the whole curriculum which offers so many sorts of difficulties as nature-study does—and especially is this true in congested districts.

At the very outset, a number of serious obstacles present themselves: (1) Lack of material; (2) Difficulty of securing suitable material at the proper time; (3) Lack of time to care properly for material provided; (4) Lack of specific directions concerning the work—lack of detail as to what should be taught under each head; (5) How to manage a class of forty or fifty pupils, so that each may get the maximum benefit from individual study of the material provided; (6) Lack of proper correlation of nature-study with the other subjects of the course. Much of the work fails because it is still aimless, unrelated and unorganized. (7) Lack of the proper apperceptive basis on the part of the pupils. This is perhaps the greatest obstacle with which we have to contend in our work in congested city districts. It is difficult to realize the extreme narrowness of view concerning nature subjects—of many of our pupils in crowded districts. The perspective is very different from that of children in suburban districts. To the city child every flower is a rose or a daisy. His acquaintance with animals often embraces merely the horse, dog, cat, mouse; his range as to birds is covered by the chicken, goose, duck and perhaps the turkey, as seen in the markets; also the

canary, sparrow and parrot. Still, it is just as needful that such a child should be trained to understand the things of real life in nature, especially those which are more or less closely related to his welfare. It is reasonable, however, to say, that in congested districts there can be less observational work as far as range is concerned than in less crowded districts or in the suburbs, but it does not necessarily follow that the kind of observation should differ. The child in the congested district has an immense appercepti ve mass, such as it is. A writer in one of the recent educational magazines calls attention to this very point. "The sky scraper, the elevated road thundering overhead, the subway roaring beneath him, the great bridges, the thronged thoroughfares, all these tend to make him alert—but how little does he know of hills and vales, of green fields and running brooks of the haunts of wild flowers, of the habits of birds?"

At present, there seems to be sweeping over us another wave of utilitarianism as regards education. Much is being said and done nowadays toward making school work more *practical*. Before long, we shall find every subject of the course subjected to severe tests and criticisms and viewed from this point, it is a difficult matter to determine *just* what *is* practical. The experts will probably *never* agree. Like everything else, the only safe path will be the middle path—avoiding the too theoretical on the one hand, and the too utilitarian on the other.

There is no subject in the course which presents greater possibilities here than does nature-study. On the theoretical side, it has endeavored to train observation, and appeal to the æsthetic sense; it has the two-fold educational value as information and as culture. On the other hand, it has attempted to be practical in the broadest sense. But the content must vary, of necessity, with the surroundings of the school and the needs of its pupils.

In country districts and in the suburbs, we may demand access to the fields and woods; in less favored districts we may have school-gardens and window boxes; in the congested districts, we are forced perhaps, to be content with a few potted plants which must be coaxed to live at all, and perhaps we must use collections of various sorts. But we *can* do our best with these, for it is only in this way that the city child can secure first-hand contact with nature and lay the foundation for broader work—because the very fact that the pupil lives so narrow a life is the very *best* reason

why he needs nature-study training. Let us commence our work with his environment and gradually seek to enlarge his horizon, keeping in view the principle of correlation.

The value of our work should never be measured by the amount of knowledge acquired, or by the ability of the child to express what he has learned either orally or in writing—but rather by the sympathy and interest awakened. Every subject *has* teaching power when properly presented. The nearer this subject is to the child, the greater will be his interest, the greater will be the power of the subject—other conditions being equal—and as a result, the child is placed more closely in touch with his surroundings, and becomes more contented therein. He also becomes more efficient. Understanding conditions to a certain extent, he is better able to rise above them. Moreover, these so-called "common things" are just as efficient means of developing the imagination and training the higher faculties as are any of the other subjects of the course. The "common things" will furnish abundant sense—material which may be elaborated into more complex psychic products and serve as the basis for deeper and broader work.

In our congested districts, the parents of the pupils are engaged in certain industrial pursuits. These could be used to furnish the basis of lessons to the pupils, who might be taught to see in them much more than merely a means of securing a livelihood. The subjects selected for our work *must* be governed to a great degree by conditions, rather than by ideals. Further, we must not only begin with common objects and events, but we must endeavor to begin with the child's own natural point of contact with these objects or events.

The nature experiences of younger children, those of kindergarten age for example, and even for those in first two or three years in school are varied and numerous, but are all closely related to their immediate surroundings. Therefore, the teacher must prepare herself thoroughly from the perspective of the *child*. She will very likely find that her pupils know much more than she gave them credit for. These earlier experiences are unrelated and unorganized perhaps, and such relations as do exist are merely relations of things really observed or experienced, and have little or no reference to any sort of scientific scheme, but they are valuable, nevertheless.

The Course of Study in New York City

A careful reading of the introductory note to the course of study in nature-study convinces one that the present course is better and shows more careful thought in planning than much of our teaching would lead us to suppose. The trouble seems to lie, not so much in the course itself, perhaps, as in our interpretation, or rather misinterpretation of it.

The last paragraph of the Introductory note—printed in italics for the sake of emphasis—states, "It should be clearly understood that no class is expected to study all of the topics in nature-study that are *suggested* in the syllabus."

The great difficulty in the case of many teachers is that they endeavor to teach *too* much. Someone has said, "I would rather have a child spend a whole term observing how a *single* spider spins its web, than that he should study a different species of spider." Despite the clear and emphatic statement in the course, many teachers have been thinking only of the *number of topics* placed under a particular grade, and with a feeling of "I can't do it, it's no use to try," have permitted the subject to slip entirely, or have taught a little here, and a little there, in a lifeless sort of way, without interest or enthusiasm; and, therefore, the work is valueless or very nearly so.

It is ruinous to the whole spirit of the subject to stick too closely to the course. The question of what we shall teach depends upon so many "variable factors—environment, time, season, special needs of class," etc. This does not by any means imply that the teacher is free to adopt a sort of "hit or miss plan." There are certain things which a child *ought* to know, and these should form a sort of basis for the work. For example, the pupil, even in a crowded quarter, should know the common trees and flowers, certain birds and insects, certain phases of the inorganic world which constantly confront him.

In many respects the course as it stands at present is an excellent one: (a) It is broad and affords a great variety from which the teacher may choose; (b) it is elastic enough in that it permits the teacher to substitute other material when such is more accessible or more desirable for any special reason; (c) The same subjects are used for two successive terms during first three years; (d) with the exception of Grade 4B, planting of seeds forms part of the work for four years, each year with a different purpose in

view. This is excellent, not only from standpoint of pedagogy but also from that of nature-study as well, in that it tends to deepen and broaden the knowledge gained.

On the other hand, the course introduces too many subjects which have little or no bearing on the life and interests of our children. This is, in a way, a great obstacle; for the work in nature-study often takes our pupils too far away from home, as it were. It treats of many things which are almost entirely without their range of experience and which will probably always remain so. It is true, however, that many of the subjects in the course *might* be more closely related to our needs by our method of treating them. A study of the more important economic materials, for example, offers a splendid field which deserves special emphasis in our dealing with city children. Moreover, a study of the more important industries of man, beginning right at the child's own door, is full of suggestion and affords abundant material for interesting nature-study lessons.

There is such a close and vital relation between geography and nature-study that if *ever* correlation is to be wished for, it is just here. Much of the work in geography remains vague and unintelligible to our pupils because we do not study carefully enough the very elements. These could be made the basis of nature-study lessons. The subject is introduced under earth study in our course, but it is to be feared that it receives far too little attention. Someone has said that nature-study deals with the child's immediate physical environment and geography with the child's broader physical environment. This is a very suggestive thought. Could it not be carried out more fully, as for example, in series of lessons similar to the following?

I. Evaporation—The air acting as a sponge. Observations—H_2O from teakettle; what becomes of it? Drying clothes of the wash—What becomes of the H_2O? Drying sidewalks after rain, etc.

II. Condensation—Windows on a cold day. The frost flowers on the window pane. The "sweat" on the pitcher of ice water. Why is the breath visible in cold weather?

III. Clouds—The "*cloud*" from the tea kettle. Clouds—*Not* smoke. Origin of clouds. Rainfall. Evaporation from ocean and land surface. Forms of clouds.

IV. Erosion—Mud swept from streets by heavy rains. Turbid little streams, leading to knowledge of greater streams. What becomes of the soil?

V. Frost—bursts pitcher or glass—why? The water-soaked stone. The shelling of the Obelisk in Central Park—why? The "carving power" of rain and frost. The deposits of soil, etc., in the lowlands fertile valleys, etc. The geographical location of certain treasures; the adaptation of certain climates to the successful transplanting of certain plants from their original homes—staples like coffee, sugar, tea, cotton, grains, fruits, etc. The resulting effects on man's comfort, the wealth of nations; agriculture, manufacturing, commerce.

Suggestions for Improving the Course

(1) Divide the present work in each grade into: I. Required; II. Optional. Under I, include a few important topics—examples of which could readily be obtained and which have some point of contact with the children's lives and interests. Under II—place the extra work.

Under I, for example, teach cat, dog, canary, common fruits, vegetables, flowers, etc. Under II, rabbit, squirrel, etc. This may be open to criticism to be sure, but at least it possesses this advantage that all pupils will receive some definite training, while the enthusiastic teacher would find ample scope for additional work under II.

(2) Omit, in all cases, birds, flowers, etc., which are, comparatively speaking, rare. The course almost covers this at present. In the Introductory note we find, "The common rather than the rare," but in congested districts, many seemingly common things are almost unknown.

(3) Omit classification of animals in Grade 5A. Children lack sufficient knowledge to serve as a basis.

(4) Carry work through 6th year.

(5) The topics selected for study should be definitely stated for each grade, i. e., the topics to be studied as types. I include this, because it was included in so many of the reports received.

(6) Study the sky for its beauty—make more of clouds, cloud forms, storms, etc. More attention on the whole, to the so-called inorganic nature-study.

(7) Lay *more* stress on actual contact with natural objects. Give *less* attention to supplementary nature readers.

(8) Fourth year needs revision.

(9) A number of teachers earnestly request information on points like the following: (a) How shall I proceed to add to my personal knowledge, so that my work in nature-study may be productive of better results? (b) How can I learn to care properly for terraria and aquaria? (Lack of proper conditions in school—temperature changes, dust, etc.) (c) Instructions as to planting seeds, care for seedlings, what to plant. (d) A simple study—not scientific—of the common wild flowers and where to find them. (e) A good list of reference books.

Further suggestions included references to visits to parks, museums, etc. One paper suggested that the work in the syllabus might be more explicit as to method, mode of treatment, etc. Another says—"Would it be possible to secure greater cooperation between the Park Department and the schools? The prunings and cuttings from the parks would be invaluable to the schools in certain sections. The same is true of nests, cocoons, etc. "The fields in the parks might be cultivated, and the products sent to the public schools," writes one teacher. Such cooperation might tend eventually to check the ruthless destruction of shrubs, trees and especially of wild flowers in the parks.

Above all, let us not even attempt to teach nature-study as so many books tell us to do. In this subject more then in any other, it is individuality that counts. As stated before, the measure of our success is not the amount of knowledge we impart, but the purpose we develop in our pupils to see and learn and love for themselves.

We must imbue our work with interest, with enthusiasm, with life, and this we can only do when "we feel the glow in our own hearts."

Committee: Margaret Knox; Ellen M. Phillips; Carrie W. Kearns; Elise W. Kornman; Helena A. Hulskamp; Lena Kemp; Loretto M. Rochester; Anna Short; Lydia Miller; Amelia Schaller; Martha Bayles; Nina M. Loper; E. J. Bellamy; M. E. Castle; Ida Nulle; Lucy A.Sheehan; B.B. Lenkawski; Nathaniel Fleisher; L. M. Caroly; Agnes Burgess; Olga Marx; Myrtle Spaulding,—all of the public schools of Manhattan and Brooklyn, New York City.

DEPARTMENT OF SCHOOL AGRICULTURE

Conducted by BENJ. M. DAVIS
Miami University, Oxford, O.

AGRICULTURE IN SECONDARY SCHOOLS IN CALIFORNIA

By ERNEST B. BABCOCK
College of Agriculture, University of California

Since the day in December, 1905, when Dr. A. C. True, Director of the U. S. Office of Experiment Stations, addressed the joint session of the California Teachers' Association and State Farmers' Institute, on behalf of agriculture in the public schools, definite progress has been made toward establishing such study . Said Dr. True, "So the farmer comes with his economic, social, and industrial needs to the teacher and asks what the schools can do to make him a more successful business man, a better citizen and neighbor, a more intelligent and happy man." And further, "We will not permit the adherents of old educational ideals to set an *industrial* education over against what they call a *cultural* education. It is an education truly and completely cultural which we demand, and our insistence is that no education can be completely cultural which does not contain the manual or industrial element."

California deserved some credit for having already made a good beginning in establishing a state polytechnic school in 1901. "The purpose of the school is to furnish to young people of both sexes mental and manual training in the arts and sciences, including agriculture, mechanics, engineering, business methods, domestic economy—." This institution is situated at San Luis Obispo, which is near the coast and two hundred and fifty miles south of San Francisco or midway between that city and Los Angeles. It has been a success from the beginning and the attendance has grown to nearly one hundred and fifty with about one-third in the agricultural course.

Another step in the right direction had been taken by the Legislature of 1905, when an appropriation of one hundred and fifty thousand dollars was made to purchase a site for a university farm, with the understanding that a secondary school of agriculture should be established thereon. In 1906, a site was chosen at Davis, near Sacramento, seventy-five miles northeast of Berkeley. In 1907, a second appropriation of one hundred and thirty-one

thousand dollars was made and the erection of buildings was begun. The last Legislature made another liberal appropriation of more than two hundred and twenty thousand dollars. Most of the second and third appropriations is being used in the erection of buildings. The University Farm School held its first session last spring with an attendance of eighteen boys. This fall the second year opened with an enrollment of forty boys and young men. The average age is eighteen. The prospects for growth are very encouraging. Besides the school of agriculture the annual farmers' short courses are held regularly at the university, farm and this brings a large number of progressive men from all parts of the state to Davis, with the result that the school itself is rapidly becoming more widely known. Advanced college students from the University also spend a portion of their course at Davis under the supervision of a corps of experts detailed from the Experiment Station at Berkeley.

Thus we have the successful beginning of a system of special agricultural schools of secondary rank, which should make glad the heart of Assistant Secretary of Agriculture Hays and all others who believe that secondary instruction in agriculture should be given in just such institutions.

But it seems that California is never satisfied to do things by halves. In her present efforts to extend agricultural teaching, as in the first attempts to grow oranges, all kinds and methods had to be tried, and many experiments made. Her experience in oranges has resulted in the supremacy of just two types, the navel and the valencia. But there was a time when ten or a dozen sorts were considered promising. So it is today in California with the secondary teaching of agriculture. The special agricultural school seems to be a success. Just to what extent agricultural instruction will become an organic part of the complete secondary-school system of the State remains to be seen. But the prospect is strong that at least two methods of incorporating the agricultural among the other phases of our high-school instruction will be followed with success. The effect of this will be to influence the trend of natural science teaching in all schools more and more as time goes on.

Before taking up these two methods in detail, we should pause to give due allowance of credit to the University of California for the part it has taken in this evolutionary process. In the action

of its faculty, last spring by which several new matriculation courses, including horticulture and dairying, were added to the list, which the graduate of a high school may offer for entrance requirements, the university accepted these studies as rightfully belonging among those taken by students who are preparing to go to college. It thus takes a definite stand in favor of the movement to include in the high-school curriculum studies that shall actually prepare the great majority of students, who cannot attend a university, to become "successful bread-winners and home-makers."

The immediate effects of this act on the part of the University has been observed among high schools. While it is true that certain schools were seriously considering the introduction of agriculture in the past, the attitude in favor of this study is now pronounced and is actually bringing definite results in several instances.

The schools that have made a beginning in teaching agriculture fall into two classes according to (1) whether they have incorporated a specified course in the subject to extend throughout one or more years or (2) whether they deal with the subject as correlated or applied science without introducing it as a separate course.

During the present year four of our high schools have included a course in agriculture in their curriculum. These institutions are the Imperial County Union High School situated at Imperial, in the extreme southwest corner of the State, the Oxnard Union High School, on the coast north of Los Angeles, the Kern County Union High School, at Bakersfield and the Hanford High School in Kings County, both in the southern San Joaquin Valley. In each of these schools a specially prepared man has been employed at a salary of twelve hundred dollars. The teacher in the Imperial School, Mr. David N. Morgan, is a recent graduate of this university. He has kindly furnished a brief description of present conditions. The letter is interesting and has a spirit of its own. I reproduce it in part below:

"The high school work has far exceeded my expectations. Twelve are enrolled in botany and plant propagation, six in the dairy course and six in the course in livestock. I also have the entire entering class (twenty-eight) in physical geography.

"I have discovered that the botany work must be distinctly Imperial, for we have no local flora to furnish the usual material for such work. The class is using Bailey's "First Lessons in

Biology." Along with it I am working in topics of general interest such as seed selection and germination, tests of alfalfa that is being actually planted, so that the results of our work can be shown in the crop itself. Also the matter of preparing land for lawns and gardens. This is the season for planting what we (in northern California) plant ordinarily in April. Questions on other topics come up frequently.

"The soil on the school grounds is very hard, difficult to work, and the alkali bothers considerably. We have a lattice-work house, sixteen by thirty-two feet, for plant-propagation work. The beds were all sunken below the ground surface, and consequently full of alkali. I am putting in raised beds, eighteen inches of soil with six inches of drainage, in order to get rid of the alkali. I have been experimenting the past week on adding lime to the soil as a corrective for the adobe and have carried it sufficiently far to see that it is in part what is needed. Now I must determine the least amount one can use and still get the desired physical condition. The class is very much interested in the Smyrna fig and will propagate it. Cuttings of the hardier grapes can also be planted so as to furnish material next year for work in root grafting.

"Under the head of livestock I am giving the class lectures; one day a week we devote two periods to actual work with the horses. As a large number of the pupils drive to school, we have plenty of material to illustrate nearly every variety of unsoundness, also to study anatomy, and types of horses. Cattle, hogs, sheep and goats will follow. The Dairymen's Union has asked if I would be prepared to make tuberculin tests; also if I would address them on the subject at one of their meetings. Needless to say I agreed. The course in dairying is working out well. Leaving out the pasteurizers, churns and refrigeration plant, we have as good an outfit for instructional work as was used last year at the University Farm. The separator companies have agreed to place their latest models at our disposal.

"For the physical geography work we have a splendid equipment of instruments worth five hundred dollars. I have emphasized the value of maximum and minimum temperatures over the mean and the pupils are now taking daily observations and keeping records. An excellent transit is also part of our equipment. Observations on the sun were the order of the day at the time of the equinox.

"The pupils in the school (over seventy) are a better class taken as a whole than are ordinarily found in high schools. The stringent county examinations which all intrants must pass tend to keep up the standard. The examinations I have given have been passed by two-thirds of the class in a satisfactory manner.

"In regard to field work the people of Imperial have offered me ten acres of land to do with as seems best. The people of the

community are much interested in our work and have offered their places for experimental work. One man came after me the other day and asked me what to do for a horse with an injured knee. Upon examination I found a splint in its first stages, gave a prescription and have received advice that the animal is mending. Another man offered to give me a cow with garget. I told him to keep it, gave him a prescription, and it is also reported improving. A few more successes like these and there will be more field work than I can handle.

"The spirit of development is in this valley and it is contagious. If you could only visit me you would find conditions as I have stated. The board of trustees have agreed to build an agricultural building next year to cost at least ten thousand dollars. They have supplied all the books I requested."

Conditions at the Oxnard High School resemble those at Imperial. The trustees have provided a good tract of land and a greenhouse. The chief agricultural interests are staple field crops—sugar beets, beans, barley and oats. The teacher has made a specialty of agronomy and it working out a course to extend throughout a school year. The Kern County High School has employed a special teacher of manual training and agriculture. The principal writes:

"We are introducing the elementary course in the sophomore year and are planning to cover about the ground outlined in Voorhees' "First Principles of Agriculture." We have enough ground for experimental work and the necessary equipment for it. We have introduced with the entering class this year an entirely new scheme of work which will give a proper place to agriculture. In this course we will give them the elementary physical geography, botany and chemistry in the first two years with work in horticulture, soils, plant propagation and plant diseases in the third and fourth years. The freshman enrollment this week divided twenty-five to the academic course and fifty to the industrial, a proportion which pleases me very much."

At the Hanford High School the study of Agriculture has not actually begun but a course will be given during the next half year for students in the senior class who have had proper preparation in natural science.

There are at least five high schools in California in which agriculture is being definitely taught as correlated or applied science. These are in Gardena (Los Angeles City), Glendale (Los Angeles County), Ventura, Santa Cruz, and Yreka (Siskiyon County) in the extreme north end of the state. A detailed description of the agricultural study done in each of these schools

cannot be given here. The writer is fortunate in having a report from Mr. F. H. Bolster of the Gardena High School in the shape of an address, which he made before the local farmers' club. Following are some extracts:

"The work of the Gardena High School is distinctive not in that it is a city high school offering agriculture, for some city high schools in other States have been offering agriculture for some time. But it is distinctive in that it is the first city high school to offer agriculture as the one principal purpose of the school.

"The elementary course which was given to first year high school pupils was called general science. The aims of the course were to give a little general knowledge of several sciences to show how all these sciences are related to agriculture, and last and most important, to develop the individual by teaching him to reason.

"We used no text but performed experiments which had a direct bearing on agriculture. We would state the experiment as a question and then try to answer the question. For example, How deep should seed be planted? When seeds germinate, what gas is given off? How may we best retain moisture in soils? How can we control alkali? Do vetches grow better if inoculated with bacteria, or if not inoculated? The material would be placed before the pupils. The method would be described and the precautions given. Then they would go about it and from the result draw their conclusion which was the answer to the question. But that was not enough. Take for instance an experiment whose relation to agriculture is least obvious. What gas is given off by germinating seeds? They came to the conclusion that carbon dioxide was given off. But what difference does it make whether this gas is given off or not? What bearing does that have on agriculture. If the experiment is left there, we have only learned an interesting fact which is of no use whatever. The experiment must be applied if it is to be made valuable. I try to draw from the pupil the application to agriculture by reasoning from one step on to another. What is carbon dioxide? A gas composed of carbon and oxygen. If carbon dioxide is given off by germinating seeds, what must be going on in the seed? Oxidation or burning, the same as in our bodies when we exhale the same gas, or when wood burns. Where does the carbon come from? From the seed itself. Where does the oxygen come from? From air in the soil. Can this oxidation go on in the seed if there is no air in the soil? Certainly not. Then air must be present in the soil in order that seeds may germinate just as much as moisture must be present. This brings up the whole matter of soil ventilation—the whole matter of thorough preparation of seed bed and the pupil begins to understand that tillage is just as necessary to give air to the seed as to keep the weeds down.

"By such experiments as this the pupil learns many valuable facts, but more than this his mind should be developed so that he can apply the same form of reasoning to experiments outside the school room and answer for himself questions which may arise in the mind of any normal boy or girl.

"But we do not stop even here. After hitting a point from as many sides as possible, we go out into the garden and try to apply our knowledge. If the knowledge learned in the laboratory cannot be applied in the field, then it is useless. We plant our seeds, we give them air and moisture, and after they begin to grow, we till the soil to give air to the roots and to retain moisture.

"What is farming but the production of plants and animals? What science should be most valuable to the farmer? I would say that if one science is more important to the farmer than another, that science would be the one that relates itself most closely to the laws governing the growth of plants. Botany is the science that confines itself to the subject of plants and the laws governing their growth. Botany must be the foundation of future work in agriculture. We cannot teach fruit growing or the diseases of plants or the growing of vegetables and flowers and field crops scientifically until the pupil has had botany. A model course in horticulture, marked out by a committee appointed by the Association of Agricultural Colleges and Experiment Stations, requires three years of botany to two of chemistry. Chemistry is important, and physics, as the foundation of all science, also. But botany cannot be properly taught without drawing on chemistry and physics and other sciences.

"In the coming year botany will be the agricultural science. The method of teaching it will be the same as for general science. In fact, it will be made a sort of advanced course in general science. A text-book will be used as a sort of frame work around which to group the experiments and garden work.

"As some of the practical outdoor work we will plant trees, both fruit and shade. When we study the structure of stem and consider the cambium layer we will naturally take up the subject of grafting and give much practice in the different modes of budding and grafting. I hope to interest the class, too, in plant improvement. We will handle the matter of seed selection in general, and then I want the class to take up a special fruit and a special flower to hand down to the next class for them to follow out and improve.

"Chemistry will be given this year, as a foundation for a course in soils and for the domestic science work. Manual training or carpentry will be given as a part of the course in agriculture.

"What will the work described lead to? The advanced courses marked out for work after this year are only tentative, and I am sure will be revised before the year is over. Agriculture is the production of plants and animals useful to man, and the uses of such plants and animals so far as they are closely related to their

production. Then, in my opinion, our work should be along two main lines—plant production and agrotechny as related to plant production, and animal production and agrotechny as related to animal production.

"Both plant and animal production deserve consideration in our school because of the large values of both plant and animal products that are shipped from Gardena. Few people realize how great an agricultural community Gardena is. Here are a few figures:

"During one month 76,534 crates of berries were shipped from the vicinity, valued at $100,000. During the year Gardena shipped $480,000 worth of berries. Eight tons of vegetables leave Gardena every day, valued at $30,000 per year. We ship 40,000 tons of barley hay per year. Valued at $10 a ton, our barley hay alone is worth $400,000. Poultry products $125,000. Milk shipments amount to $60,000 per year. One man carries out of Gardena $7800 worth of poultry a year and there are other men who buy poultry whose estimates I could not get. The Gardena hatchery alone ships more than 150,000 chicks a year, and during the time it is running full blast pays from $1500 to $2000 per month for eggs. There are two other men who hatch chickens, and I have no figures for ducks and geese. Estimating the amounts paid by the hatchery as one-fourth of the eggs produced in Gardena we have close to $96,000 worth of eggs per year, and the total animal products nearly $200,000.

"The animal products are about one-fifth that of the vegetable products. Plant products should be more than animal products, but the difference should not be so great. This great difference is one reason why the school should do some work in animal husbandry. It indicates that the people of Gardena are shipping all their products from the land and never putting anything back on the land. Diversified farming is the only insurance the farmer can have against the ultimate impoverishment of his land.

"An agricultural school owes as great a duty to the city as to the community. But our duty to the community is to look out for the interests of the small farmer and the small producer, rather than the large. I mean the man who has from five to fifty acres, rather than the man who has a hundred and fifty. We will give a really useful and practical education. We will educate toward the farm instead of away from it by showing the city boy who may take our work that farm life is, after all, the healthiest, most comfortable, and sanest life; by showing the farm boy that there is a side to farm life beside the drudgery; that it calls for a man of as much ability and intelligence to be a good farmer as to be a good lawyer or a good man of any other profession."

How many high schools there are in which agriculture is given more or less attention in connection with natural science, it is impossible to even estimate at present. Whether California's

experience with oranges will be repeated in her secondary instruction in agriculture and, from a mixture of several elements or types of instruction, only one or two become the accepted standard, remains for the future to disclose. Present signs indicate that at least three will be of permanent value—the special state school of agriculture, the regular high school with an agricultural course, and the high school that emphasizes agriculture in teaching natural science. Several high schools have announced that they will introduce agriculture next year and the problem of securing properly qualified teachers is one of the chief difficulties now confronting us.

AGRICULTURE IN THE ELEMENTARY SCHOOLS OF LOUISIANA

By V. L. ROY
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The incorporation of a new subject into an established school system is not a thing to be accomplished by fiat of school authorities. Years ago, Louisiana's legislature enacted a law requiring the elements of agriculture to be taught in every common school in the State. Until 1905, nothing was or could be done to carry the law into effect. Then a new and virile school administration began to grapple with the problem. Today a large majority of the common schools are doing effective work along one or more of the different phases which the subject assumes in our school system.

Below the seventh grade there is no formal instruction given in the subject. Here the work consists of nature-study, school-gardening and home growing of crops through the means of boys' agricultural clubs. The course in nature-study covers the first six years, and has been evolved out of local conditions. A syllabus of the course appears in the Louisiana course of study for elementary schools. The work, as outlined in the course, is today given in many of our schools; in abridged form, it is given in practically all the remaining schools.

The subject of school-gardens is one that has received a great deal of attention during the last three or four years. Now the work is general in the State. Not all schools do the work as completely as the outline given in the course of study would require; but, in very few schools indeed do we find that subject wholly eliminated. Where that is the case, the students do home garden work under the directions of the teacher. That, however, is a form that has proved unsatisfactory in Louisiana. In schools having but one teacher, the school-garden work is generally done

by groups. In graded schools, where each class has its own teacher, there is ordinarily a class bed, cultivated by the class as a whole, and individual beds; in other schools, both methods are used. Sometimes pupils who are specially interested in the work are allowed the privilege of growing crops for profit. Last year, for instance, two boys raised cabbage on a plot of the school, one-twentieth of an acre in area; they worked diligently, hauled manure for their crop, cultivated it with care and under direction of their teacher. They harvested the crop early and peddled it in town, receiving in cash from their sales over $38. That is on the basis of $760 per acre gross; and, needless to say, this is well above what our gardeners ordinarily make out of cabbages. It is interesting to know that, as a result of the work done in the school-garden by these two boys and others, the farmers of that community have since organized a truck-growers' association; and, today, I estimate that there is ten times as much land planted to cabbage in that locality as there was two years ago.

The instruction given in agriculture in the seventh grade follows Burkett, Stevens and Hill's text-book. Here, too, the school-garden enters into the work. In this connection, it may be of interest to refer to a new work begun this year in some of our parishes. This consists in the operation of a demonstration farm in connection with the school and the teaching of agriculture. Thus far these farms are found only in connection with some of the larger rural schools, where many of the boys are large and capable of doing the work required by the enterprise. This movement is running parallel with the new agricultural high school work of the state. In such schools, the course is being broadened and made vocational. We believe there is a place in our school styem for such schools, where the multitude of country boys can learn something of the scientific side of agriculture before they are everlastingly consigned to the farm; for, few of our farmers' boys ever reach the high school, whether agricultural or literary.

The boys agricultural clubs were first organized in Louisiana two years ago. Now there are 2500 members, and in 1910, we will have 10,000 boys in the work, to help drive better methods of farming into our farmers while the boys themselves get the best sort of training. At the State Fair at Shreveport, 1909, the boys' clubs had the largest and best exhibit of corn ever shown in Louisiana. Space will not allow me to discuss the value of these clubs to our school work in agriculture.

BOOK NOTES

The School Garden Book. By Clarence M. Weed and Philip Emerson. New York: Scribners 1909. 320 pp., ill.

This interesting garden book has a title which is somewhat of a misnomer, for of the 320 pages there are 242 (Part I) devoted to general essays on plants and gardening such as one might expect in any good garden book, while less than 75 pages is definitely devoted to school-gardens for children. It is true that the Part I contains much useful information and many suggestions which apply to school-gardens, or to any other gardens, but the application is not often clearly indicated for the use of teachers who are not already expert in gardening.

Part I presents in twelve chapters "the garden month by month," but this title is not always strictly applicable to the contents of the chapters. For example, one is surprised to find a section of the September chapter on China asters and one in the October chapter on California poppy. Of course, these plants bloom in these months, but also in several earlier months. In our New England climate we do not plant seeds of these in these months, and so the chief excuse for including in these particular chapters seems to be the opportunity to write very readable essays on the beauty of the plants, and perhaps stimulate some interest for use another season. At a rough estimate three-fourths of the matter included in these chapters by months does not belong in any particular month; and some other grouping of the materials would have made the book much more helpful to those who need help in preparation for managing school-gardens. Certainly the beginner who expects to use this book for guidance needs the caution that it should be read far in advance of the months designated on the basis of the flowering time. Otherwise sweet peas and garden beans will be remembered in July and marigolds in August and the planting will be delayed to another year.

But all such peculiarities of arrangement as those mentioned above may be the result of the authors' extremely liberal definition that "a school-garden is any garden in which a boy or girl of school age takes an active interest." This is certainly broad enough to include anything and everything, but will hardly be a definition for those who have become accustomed to think that a school-garden is one which has been planned and conducted as part of a definitely organized educational system. This may account for the fact that the book has not been more definitely organized with reference to the systematized and correlated work of schools.

However, the above remarks are not intended as a sweeping criticism of this new book, but simply to point out that the authors have failed to make the most of the possibilities in arranging their materials so as to be of the greatest possible use to the thousand of teachers who are interested in school-gardens as part of elementary school instruction. The kind of a school-garden book which most teachers really need and which will develop the best educational possibilities of school-gardens has not yet been published. We need a *vade mecum* of beginning gardening in which the principles and important facts are set forth with a minimum of literary frills and ornamental pictures.

THE

NATURE-STUDY REVIEW

DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

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EDITOR'S NOTE

With this number the fifth volume and year of THE NATURE-STUDY REVIEW is completed. The next volume will be under the editorial direction of Professor Fred L. Charles, of the Department of Agricultural Education in the University of Illinois, who is already well known to readers of THE REVIEW as editor of the Illinois Number (December, 1908), and as author of many leaflets and bulletins issued from the De Kalb (Illinois) State Normal School.

After January the office of THE REVIEW and of the American Nature-Study Society will be at Urbana, Ill. In order to lighten the new editor-secretary's work for 1910, the present secretary has sent out letters asking members to co-operate by paying annual dues to the present office early in January so that the mailing lists can be completed for 1910 before transfer of the records.

The retiring editor takes this opportunity to express gratitude for the support and encouragement which has been given by all the leaders, both national and local, of the nature-study movement in the United States and Canada. It would be a pleasant labor to continue for another term of five years the duties of editor and secretary with such co-operation as has been given by numerous friends of THE REVIEW and of the American Nature-Study Society; but rapidly increasing pressure of other and necessary work has made it desirable, and especially more fair to the interests of the Society, that plans be made for transferring the work of editor and secretary to other hands. Accordingly, the Council of the Society has unanimously nominated Professor Charles for the combined office of secretary and editor; and for

him the retiring holder of these offices bespeaks the full measure of the support which in the past five years has been so generously given by several hundred stanch friends of the nature-study movement.

M. A. BIGELOW.

NATURE-STUDY AND FIELD WORK IN VICTORIA

By J. A. LEACH

[EDITOR'S NOTE.—This letter concerning the nature-study movement in Victoria will doubtless surprise many readers who think of nature-study as limited to children of elementary-school age. This is the primary meaning and place of nature-study ; but so long as there are intellignet adults who have not learned to study the common things of nature, so long should there be an extension of the nature-study movement to include the children of larger growth. This letter shows one way of accomplishing this end. Where in the United States and Canada could a field naturalists' club organize a group of one thousand or more persons for an excursion designed to make a scientific study of some natural wonder?]

Nature-study is now being better understood by our teachers and so the work done is improving rapidly. It has been found necessary to draw a distinction between science and nature-study, though I must confess that on a first reading Bailey's "Nature-Study Idea," it seemed that the difference was not great, and that rather much emphasis was placed on it. However, it is more necessary than ever that this difference should be kept in mind.

In Victoria nature-study is prescribed for classes I, II, and III (average age ten years, six months) and science for classes IV, V and VI, so there is little danger of confusing the aims. One undesirable result has been though, that, just when the nature-study habit is growing, the work is dropped at school and in too many cases much is lost for lack of a little stimulation.

On the question of the formal lesson, we hope that it will be possible to dispense with this, and take the work in the incidental manner Bailey has commended. At present with untrained teachers, the formal lesson is very valuable. Preparing one a week is not a serious burden, yet by the end of the year the teacher is acquiring a certain amount of knowledge which will greatly help him in future work. Soon, perhaps the formal lessons may be reduced to one per month. Some, though, will always be worth giving after the children have carefully studied the subject and are prepared with ideas of their own to assist in working out some connected thoughts on an important topic, such as the work of the leaf.

This year the Victorian Education Department has appointed an "Organizing Inspector of Nature-Study" so that we are in hopes the work will develop. The first work set in hand was the training of a special class of fourteen selected teachers (10 Victorians, 2 South Australians and 2 West Australians). These men started work last April and concluded their course in December. Besides the originally planned scheme of nature-topics, they have attended university lectures in zoology, physiography, and botany from Professors Spencer, Keats and Ewart respectively. They have also had a special series of lectures from Dr. Cherry, Director of Agriculture. A special feature has been the field work and two or three or four days have been spent each week in the field in practical work. The Saturday excursions were accompanied by leaders of the Field Naturalists' Club and the leading scientists of the state. Then the members of the class have had a varied experience and have seen experts of many different branches at work.

These men go out next year to take charge of country centres for three months at each, to show teachers what there is to deal with in their localities, how to find it and how to deal with it in their nature-study work. They also give sample lessons to children before the teachers. It is expected that teachers will then be in a position to deal to much better advantage with nature-study. Of course many of our teachers have been doing good work in this subject, but some were without special knowledge and special interest and so had no power of seeing anything in their surroundings.

Another branch we have found very successful this year was the holding of very large excursions at prominent geographical features throughout the state. This work is developing very rapidly and promises to arouse much local interest amongst parents and general public and to result in much good to education generally.

Starting with 350 pupils and teachers at Daylesford, we found the public much interested and the local press gave considerable space for a full report. These children mostly walked the eight miles involved in reaching the selected locality and then viewing the desired features.

Our second excursion saw 520 scholars and teachers on twenty-five buss cabs, etc., traveling twenty miles from point to point.

This was a great success. The crowd of course was easily kept together and a most enjoyable and profitable day was spent at different points of interest. Each child takes two meals and coppers are boiled and tea provided, so catering is simply managed.

The third excursion was by special train from Zenalla to Glenrowan to a gap in the granite range through which the road and railway from Melbourne to Sydney passes. The sharp peak overlooking the gap is Morgan's Lookout (Morgan was a notorious bushranger). On account of the expense of the special train, no limit could be placed on the number taken. Great local interest sent many people in by buggy, etc., from the surrounding districts, so that over one thousand attended. The children were marshalled and the general public allowed to picnic. This was not an advantage as some of the children also desired to follow the picnicking parties. In the following week at Mt. Arapiles away in Western Victoria we decided to try the whole party as one whole. This is an outlying mass of old sand-stone rising abruptly from the flat wheat-growing area of the N. W. and so is regarded locally as a "geological freak." Some came over one hundred miles. The railway department granted very cheap rates. All the leading public men of the district were present.

The large party displayed great keenness to get at the history of the mountain and worked well together. Over 1100 were present and nearly all climbed to the highest point to enjoy the fine panoramic view.

A fortnight later a special-train from Castlemaine was crowded for Mt. Tarreogoewe. Over 1200 attended. We were favored by glorious weather and had a most successful day. This party also worked as one whole.

Our next excursion was on the glacial deposits 25 miles from Zendigo at Derrinal. Again we had 1200 and a good day, so far as stimulating local interest is concerned. It is a very heavy day's work to take such a large crowd in the open air for about three hours' work.

The next gathering was at Berwick, where an old lava flow resting on the leaf beds of a tertiary lake, and that again on the Silurian bedrock, forms a prominent local feature. Forty-one schools were represented. The councillors, clergymen, and

public of the district attended, so that much interest was aroused.

The next big excursion was to the famous canon of the Werribee River, where it has carved a narrow, deep gorge partly in a Carboniferous glacial deposit. This was limited to 600 children of classes V and VI from Ballarat schools, and the inspectors and teachers. These were divided into twelve sections. A member of the nature-study class took charge of each section, conducted it to each of the previously selected twelve geological features and led the pupils to see the meaning of each. Over 800 attended.

Our last excursion for this year was at Hanging Rock, a remarkable and popular picnic resort about 40 miles from Melbourne and seven miles from a railway. Over 1000 attended, coming from all points of the compass. Many farmers suspended ploughing in a potato district so that their men and themselves could attend.

The leading daily newspapers of the state give very good press notices, and the illustrated weeklies often publish a full page of views so that great inquiry has been aroused in local features. No longer do all the wonders dwell elsewhere.

In addition to the Friday's work, the teachers meet on Saturday for three hours' work in the field. The Friday is not regarded as a holiday, for teachers who attend on Friday are also expected to attend on the Saturday morning.

On Saturday we usually meet close to a school and then do ordinary everyday nature-study, so that while a teacher might possibly object that the Friday's work was of little direct value to him because a special locality with features on a large scale (so all can see) is always chosen and his school district may not contain similar features, still he must admit that his district is at least as good and generally is better than the district where we work on Saturday.

Having teachers only, questions are asked, methods criticised and difficulties removed, so that for direct results the Saturday's work is of more immediate value to the teacher than the Friday's, but still the Friday's work is worth doing for it stimulates a district.

Next year we shall try to reduce the numbers a little, but all depends on the features. It is easier to manage 1000 at some places than 20 at others where things are on a small scale. Some

districts are already making this outing an annual affair, and letting it replace the school picnic. Next year we hope to extend this work, for many applications for excursions have been received.

The first requisite for successful nature-study work is to show that there is something worth looking at and thinking about everywhere, and these big excursions serve a very useful purpose in stimulating local inquiry and local talk. The amount of individual teaching may be small, but still each and all will probably carry away as many ideas as they can assimilate for the one day.

We find geography in the field an excellent basis for nature-study. The geography is always there and is generally easily read (geological maps are supplied for many districts). Bird life, soil formation, plant life and animal life follow naturally and provide variety.

HOURS WITH THE FLICKERS

By EDNA RUSSELL THAYER
Worcester, Mass.

[EDITOR'S NOTE.—In this magazine for December, 1906, Miss Thayer reported a series of relay observations which groups of Professor Hodge's students made on the day's work of various birds during the nesting season. It was very suggestive to teachers and pupils, and in a form likely to stimulate attempts at similar continuous observations. The following account is a useful supplement to the first article, for it shows what one observer may see in a series of days. These two articles, and a similar one by Miss Mann, in the magazine for December, 1908, deserve reading by pupils in connection with bird study. A limited number of copies of December, 1906 and 1908, are in stock and for sale at five cents per copy.]

Upon my arrival at camp on June 25, 1908, I was told that there was a flickers' nest in the southern side of an old apple tree. The birds had bored an opening very much the shape of a top, circular at its upper end and pointed at the lower, in the trunk of the tree just three feet above the ground. They had then dug out a nest fourteen inches deep and five inches across. The ground was covered at the foot of the tree with chips, few of which were larger than a quarter of an inch.

There were young, but how old I do not know, as the nest was not discovered until the day before it was shown me. They were old enough, however, to cry softly as I scratched upon the bark of the tree in imitation of the old birds.

On the following day I began to watch the nest, to learn all I could of flicker life.

June 26, from 3.40 to 5 P. M.—I sat down about twenty feet from the nest. After twenty minutes watching, the female came to the tree (4 P. M.) and the male flew out and away. He had brooded the young during the female's absence. The female was very much disturbed at my presence, and circled around me from tree to tree, giving her cry of alarm many times. After an hour and thirteen minutes, I left the orchard, fearing the young might suffer. The female had remained nearby all the time, but the male I did not see after he flew out and away when the female arrived.

June 27, 3.40 to 5.15 P. M.—I was wiser than on the previous day, and took my position fifty feet away from the nest, and at one side, so that I could not see the opening, but could watch the old birds. At 4 o'clock the male bird came to a tree one hundred feet away from the nest and the same distance from me, and sat upon the topmost dead twig. His mouth was open; it was a warm afternoon. He remained perfectly silent, but evidently he was watching. Soon (4.16) he came to the tree, just outside the nest, gave several little calls, at which the female came out of the nest and flew away. The male then went to a tree forty feet away, where he remained on guard. One would not think the flickers' striking colors at all protective, and yet I might have looked at the tree many times and not have seen him. He looked like a part of the gnarled branch upon which he sat perfectly flat lengthwise of the limb.

Fifteen minutes later (4.31) the male flew to the nest opening, clung to it for a moment watching me, then went inside. For several minutes he kept looking out, but finally deciding that all was well, went down again, and brooded the young thirty-three minutes or until the arrival of the female at a nearby tree (5.04). She made no sound, so I wondered how the male knew that she had returned. The female went directly into the nest (5.06), after having been away fifty minutes. The male had come without food so far as I could see, and now to my surprise, the female brought none. What did it mean? I immediately went to my books, but found nothing of the flickers' feeding habits. I had yet to learn that the young were fed by regurgitation.

June 28, 3.40 to 5.14 P. M.—After watching the nest for a half-

hour, the male put his head out of the nest (4.10) and looked at me for seven minutes. When he flew away at 4.17 he must have found his mate, for in three minutes she came to the nest with a little cry. She brooded the young birds for thirty-nine minutes (4.59), then after looking out several times, flew away (5.01). At 5.07 the male came to the orchard, and a little later went into the nest (5.14).

June 29, 3.40 to 4.58 P. M.—The male was in the nest when I reached my place of observation, and twenty-four minutes later (4.04) flew out and away. The female came to the nest three minutes afterward (4.07). I did not see her coming and I heard no sound until she struck the trunk of the tree. After brooding her young for sixteen minutes she put her head out, with her mouth open (4.23). It must have been very hot in the nest, for the day was a warm one. Four minutes later (4.27) she flew away, but returned at 4.53 and went at once to the nest. I did not see the male after he left the nest at 4.04.

June 30, 3.40 to 5.26 P. M.—I changed my position to one seventy-five feet away, but in front of the nest. The male flew about, but would not go to the tree. In twenty minutes (4 P. M.) the female came to the next tree, four minutes later to the back of the nesting tree, crept around it and went into the nest. In seven minutes, she flew away (4.11). It was very warm, and I opened my umbrella just after the female had flown. I kept it up forty-six minutes, but neither bird came. At length I closed my umbrella and in eleven minutes (5.08) the female came to the nest and went in. She stayed but a moment, then flew away. The male was not in sight for an hour and twenty-nine minutes.

July 1, 3.35 to 5.13 P. M.—The male flew away from the nest as I approached. Eight minutes later, the female came with a little cry and remained in the nest for four minutes, then flew away (3.47). She returned at 4.20, and stayed but a moment. Three minutes after she disappeared, the male came to a nearby tree where he remained absolutely motionless and flat against a large limb, with another between us, for forty-four minutes, or until 5.08 when he gave his "wick" cry several times, as the female approached. She paid no attention to him, but went directly to the nest (5.10) where she remained two minutes. Then the male went to the nest, but came out at once and flew away.

July 2 was stormy and I did not watch.

July 3, 10 A. M.–12.07 P. M.—I moved this morning to within sixty feet, still in front of the nest. When I sat down, the female was in the nest tree, while the male was nearby, and they gave utterance to soft cries as if "talking" to each other, while the young kept up a chattering sound reminding one of a bee-hive. After thirty-five minutes, the female went in, but remained only a moment. The male remained flat against a large limb with another between us until 10.40 when he flew away. He returned at 10.57 to the next tree where he took the same position as before. At 11.08, he flew away. After being gone forty-one minutes, the female came to the nest at 11.16 with a low cry which was answered by the male across the pasture. She came out in two minutes. The male came to the nest at 11.37 after giving the "wick" cry for nearly nineteen minutes. In a moment he flew away, as I moved to put on a raincoat because of a sudden shower. He returned at 11.55 and remained in the nest five minutes, but looked out at me twelve times. The young called lustily. At 12.06, after being gone forty-eight minutes, the female went to the nest, but remained only a moment. The weather was warm, and there was no brooding after this date.

July 4, 3.35–5.27 P. M.—At 3.58 the female came to the nest; flew at 3.58½. Returned at 4.21, flew away at 4.22. The male came to the next tree at 4.34 and he watched me for thirty-one minutes. He flew to the pasture at 5.05, where he called loudly. In fifteen minutes the female came to the tree, and in six minutes (5.26) to the nest, remaining but a moment. Now that brooding had ceased, the birds never remained in the nest more than one or two minutes. The female procured most of the food, while the male remained near me on guard.

July 5, 2.55–5.42 P. M.—The female came to the nest at 3.13 for a moment. The male remained motionless in a nearby tree from 3.22 to 3.47, then flew away. The female flew to the next tree with a soft, low, musical but rather plaintive cry at 4.01, and sat lengthwise on the branch, perfectly flat, as the male so often did. This was the only time I saw the female in this position, and I never head her give the "wick" cry but once. At 4.09, the female fed her young. At 4.29, the male went to the nest, looked out at me, went in once, then flew away. He came again to the next tree at 4.57, but was disturbed by people coming into the

farther side of the orchard and flew away in six minutes. He returned at 5.14 and flew about the orchard near me until 5.30; he never was so quiet as today. At 5.40, the female returned after an absence of one hour and a half, and went directly to the nest. I wish that I might have followed her flight during that time.

July 6, 10.35 A. M.–12.32 P. M.—The male was in the orchard about me until 11.07, when he flew away. At 11.16, the female came to the nest, but in one minute looked out at me six times. She then came out to the foot of the tree, crept up and went in again, where she remained a moment longer. The male went to the nest at 11.27, looked out at me five times, came outside and went back in for a moment. When he came out again, he carried excreta which was the only time but once, the next day, that he ever did so. The female cleaned the nest every time she went into it. At 12.32, the male came to the nest after an absence of one hour and two minutes. I did not see the female after she flew away at 11.18.

July 7, 8.45–11.42 A. M.—Thermometer above 90°. The male came to a nearby tree at 9.16, and rested silently with his mouth open At 9.23, he flew to the next orchard with the "wick" cry, but returned to first position at 9.29. Six minutes later, the female came to the tree, where she and her mate had the prettiest little talk together for a moment, when she flew to the nest to be greeted by the young ones with a sound like a combination of buzz-saw, a beehive, the hissing of a snake, and the spitting of a cat. She flew away at 9.37 while the male remained on the next tree until 9.44, when he came to the nest. In two minutes he looked out sixteen times; then flew away. At 11.19, the female returned to the nest, and the male came to the next tree. When she flew away at 11.20½, he came to the tree over the nest. At 11.40, the male came to the nest, and one of the young climbed up for the first time, and was fed at the opening. Two minutes later, the male went into the nest, then flew away.

July 7, (continued) 7 P. M.–7.40 P. M.—I had just arrived when both male and female came near "talking" to each other, but soon both flew away, and at 7.40 neither had returned.

July 8, 3.55 A. M.–5.01 A. M.—It was a cloudy morning, and hardly light, but I wished to find out what time the female left the nest. To my surprise, she came to the nest at 4.11, and left

it at 4.12. At 4.16 she returned, and flew again at 4.17. There seemed to be no feeding either time, as the first time there was only a faint sound from the young, and five minutes later there was none at all, very much unlike the usual buzz-saw performance The nest was cleaned both times. At 4.35 the male came to a pile of stones over the wall, and called "kee-yer" three times slowly, then gave the "wick" cry as he flew about to different places in the orchard until 4.55 when both he and the female came to the home tree. The male went in, stayed one-half minute, then the female went in at 4.57 and remained a moment. At 5 o'clock, the female returned to the nest again for one minute.

July 8 (continued), 7.15 P. M.–8.05 P. M.—As I was disappointed in not finding out what time her ladyship, the flicker, arose in the morning, I determined to find out what time she retired, but again I was to be disappointed. At 7.25 I left my seat and went to the nest to be sure that the female was not within, when I heard a cry of alarm from a neighboring tree. Evidently I had been watched. It was too dark to distinguish male from female, but the bird flew from tree to tree until 7.39, when it disappeared. I remained until the orchard was dark, and the moon had risen, but no bird went to the nest. I wondered if it were possible that the mother bird did not brood her young on warm nights. There was no breeze, and it would have been insufferably hot for an adult bird to remain in that deep hole with several young.

July 9, 10.45–11.30 A. M.—The young are growing fast, for when the female came just as I sat down, she fed them without going in. They are beginning to climb. She flew away at 10.48. At 10.50, the male came to the next tree, and twelve minutes later, to the opening, where he fed the young.

July 9 (continued), 5.30–5.50 P. M.—Many times, I had tried to reach down into the nest to the young birds but could not. This afternoon a friend suggested making the opening larger, which was done, and I took out the young. There were five, all males, nearly two-thirds as large as the old birds, but only partially covered with feathers. There were the beginnings of the red and the black crescents, the black stripes on the sides of the throats, indicating the male, the white rumps, and spotted feathers. The breasts were nearly bare. Each upper mandible

was tipped with white. I placed them all on the ground which was a bit of new experience. The light probably hurt their eyes, as they kept them closed. The lids and feet were light gray. I could not remain to await the arrival of the parent birds, but I would have given much to have witnessed their surprise at finding their doorway so greatly enlarged.

July 10, 5–7 A. M.—I sat thirty feet in front of the nest, the nearest I had ventured since the first day. As I passed the tree, I stopped, scratched on the bark, and looked in. The eyes of the young birds were all very bright, and their voices greeted me with precisely the sound they give their parents. The hearing was very acute, and they had long since learned to associate the scratching sound with their food supply. At 5.07 the female came to the tree, and a moment later rested just outside the opening. Then I saw the regurgitation process, for the doorway was four inches lower than before, and all the young appeared, and four were fed. Poor Number Five received none. I wondered if his mother would remember it the next time. At 5.27 the male came to a tree near me, and preened his feathers. He was very wet, and had evidently just had his morning bath in the pond beyond the pasture. The female came to the same tree at 5.33, where she and the male exchanged soft greetings for two minutes, when she went to the opening and fed two of her young. (The old birds never went into the nest to feed the young after the opening was enlarged, but the female always went in afterward to tidy her house.) At 5.35, the female flew away, and at once the male came to the opening, and after feeding two of the young, as they hung almost out of the nest, flew away. Both male and female returned at 6.10 to next tree, and at 6.11, the female went to the nest where she fed one. At 6.18, she returned to feed one more. The male came to the tree at 6.20, and gave his alarm note, just over the nest, to which the young paid no attention, but when his feet were heard at the opening, every head appeared, and the chorus began. As soon as one baby bird was satisfied, he sank down out of sight—I suppose, to sleep. The female came at 6.53, but flew away at 6.55 without feeding.

July 11, 5.15–5.40 P. M.—Having found that the birds did not mind my sitting within thirty feet, I now ventured to sit against a pile of brush just eight feet from the foot of the tree, and

directly in front of the opening. At 5.22, the male came near, flattened himself on a large branch, and slowly scolded. Thirteen minutes later, the female came to the home tree, six feet over the opening, where she and the male "talked it over" in low tones. In just three minutes (5.38), my Lady Flicker climbed backward down to the opening where she fed three little ones, which were half out of the nest. She then went into the nest with her back to me, but she was not quite sure of me even yet, for she came out quickly and flew away.

July 12, 6.55–8 A. M.—As I passed the nest, I looked in, and put my hand in. The young flickers all buzzed and hummed, and just after I sat down in front of the pile of brush, one gave a trial "wick" cry three times. Still there seems to be no recognition of the cries of the old birds, and nothing but the scratching sound of the parents' feet brings the young to the opening. I brought my glasses from force of habit, but laughed as I sat down to think I had done so. What need has one of bird-glasses at eight feet? At 7.08, the female came. She seemed to remember that I had been there the night before, and no harm had befallen either her or her nestlings, so there was no hesitation. She came directly to the opening, where five heads appeared. She fed two of her young, and then flew away. While feeding the young, the tail was used for a brace, and there was a slight quiver of the wings. The head jerked up and down as it might while hammering on the bark, and the movement was just as forcible. The bill, over one and a half inches long, was all in the young birds' mouth which was closed tightly over it. The food was pure white always, as I saw particles of it left on the tip of the mother's beak, as she drew it from one little bird's mouth and put it into that of the next one to be fed. Once I saw nearly two inches of her long extensile tongue as she extended it for an instant. Occasionally this morning, I heard a baby flicker give a tap on the inside of the tree as if he were learning how. I never heard a tapping sound from either of the old birds. There was a subdued buzz almost continually from the young, and every few moments one would come up to the opening and calmly watch me. I took them out, and found that the markings were more pronounced, the ten pointed tail feathers almost fully grown, even the two extra abortive ones.

July 12 (continued), 11.10 A. M.–12.05 P. M.—I went out to the

nest again wearing a large shade hat. I had never worn one but once before, and now almost immediately the male gave his cry of alarm across the orchard. Five minutes later, he came to the next tree where he gave the same cry repeatedly for several minutes. I removed my hat and the alarm note ceased at once. I replaced the hat on my head, and just then the female came to the same tree as the male and they "talked it over together" softly from 11.30 to 11.45, when I again removed my hat and at 11.55 the female came to the opening, and fed two of her young. The male seemed not to like it, and "scolded" well, telling her that she would rue her rashness. She flew away after feeding, but the male continued to berate me until I left.

July 12 (continued), 5.40–7.12 P. M.—For the third time that day, I sat down in front of the nest, and soon after the female came to the nest. All five nestlings came half out of the nest, and were fed in turn. The female started to go in, but did not quite dare. At 5.55, the male began to call his alarm note behind me. (His behavior was difficult to understand from the time I had first ventured to sit close to the nest, for he had shown no more timidity than the female before that. He never fed the young after I changed my position to eight feet from the nest, but having changed, I kept it while His Majecty told me in no uncertain tones what he thought of me, having to watch me instead of helping to provide for his family). At 6.15, one of the young gave the cry, "kee yer" twice inside the nest—for the first time in my presence. Five minutes afterward, I heard the male give the "wick" cry, and at 6.25 he came near and preened his feathers, having had, presumably, a bath. It was over an hour since last feeding when the female came to the nest again at 6.43. She fed three, then went into the nest, down under that struggling mass of nestlings (I could see them bob up from the pressure beneath them), and cleaned the nest. Even after seeing I fail to understand how she did it. The male came at 6.47 and remained near until 7.12 when he gave the "kee-yer" cry, and a young bird answered him twice, in recognition for the first time.

July 13, 11.15 A. M.–12.15 P. M.—I took my position under the blazing sun, with no protection and placed my camera upon a water-pail turned upside down that I might get a photograph of the flicker as she fed her young. I hoped that she would come at once, but a water-pail and a camera were yet to be learned,

so that it was 12.10, and my neck was nearly blistered, when she finally approached the nest, and fed her young. I did not count how many were fed, but I took the picture, and the flicker did not even look around at the click of the camera.

July 13 (continued).—In the afternoon, at 2.45, I took the young birds out of the nest, placed them on the tree trunk where they clung, and photographed them. They could not have posed better had the photographer told them to "keep still and look pleasant."

July 13 (continued), 4.45–6.48 P. M.—I went again to the orchard, and sat against the tree with my head but a few inches from the opening. This was to be my last move. If she came, I would do nothing more to disturb her. After seventeen minutes waiting, at 5.02 the female gave the alarm note—a rare cry for her,—and a young bird answered it. Then the male came, and together they "talked it over," he very vigorously, and she quietly answering. Apparently he persuaded her not to take a risk for she did not approach the nest, though I sat there until 6.48, and the young must have been very hungry. The only acquisition from my two hours' vigil was a host of bird-lice.

July 14, 9.50–11.45 A. M.—The camera was placed in position and another picture of the feeding obtained at 10.30. I wished for still another, and the female came near at 10.50, but the male kept up continual cries of alarm until 11.45, when I left the orchard. One of the nestlings, the strongest one, whom I several days ago named "Bold as Brass," had his head out of the opening and continually answered the "kee-yer" of his father, as I photographed him.

July 15, 10.20 A. M.–12.20 P. M.—At 11.03, 11.33, and 12.20 the female fed her young, and I secured another photograph. The male was about all the time, but this morning, Madame Flicker was not to be persuaded that I was dangerous.

July 16.—I went to the nest several times only to assure myself that the birds were still there. Once "Bold As Brass" fluttered to the ground, and started off, but I returned him to his brothers. Just before dark, they were all there.

July 17.—Early morning, and they were gone! We heard the flickers cry daily about the place, but they had gained their independence and were no longer *my* flickers.

One day, sometime after the flickers had left the nest, I

chanced to go by the tree in the orchard where they had lived, and I put my hand into the nest. To my surprise, I found the bottom filled with sand. I dug it all out and found there was between two and three inches of it. This was queer, for the books say that the flickers make a bed of chips for their young to rest upon. There wasn't a chip inside; they were all on the ground. I think that my flickers must have "known" that sand was more absorbent than chips could possibly be, and had brought it to their nest to keep it clean and wholesome. It was a fine gravel such as one finds in a gravel pit, and it must have been brought from a distance, as there is no sand in the vicinity.

"SO-CALLED NATURE-STUDY"

By M. A. BIGELOW

In various educational journals and books, authors have mentioned nature-study as "so-called nature-study", as an "unfortunate term", and in other apologetic ways. In fact the habit of using the term nature-study with an apology has been very common, especially among college men who have been more or less displeased by some of the school work which has been classified as nature-study.

Perhaps etymologically considered nature-study is an "unfortunate term", but so are dozens of other words which by usage have become perfectly satisfactory as to definiteness of meaning. Certainly a biologist who objects to the word nature-study ought not to forget that, as Huxley once pointed out, even the name of the science—biology—deserves to be in quotation marks or designated "so-called," for literally biology is a discourse on human life and to the Greeks could not possibly have meant all animal and plant life. However, all scientific people now know what is meant by biology and only the hypercritical student of languages wastes energy in criticising the word because of its etymological inheritance. As another example, the biological word cell might be designated, in strict usage, as "so-called" and "unfortunate" and put in quotation marks. But authoritative usage has made its special meaning so definite that certainly no one outside of institutions for the weak minded would urge that cell in biological books should continue to be printed with apologies for the term having had its origin in connecting with a misinterpretation of the early histological observations.

Such examples of terms not being appropriate are exceedingly numerous in biology; and so biologists can not gracefully continue to apologize for the word nature-study by prefixing "so-called," using quotation marks or by continually worrying because the term as "unfortunate."

The truth is that the term nature-study is now definite enough in its meaning for all practical purposes. It has come to mean simply a convenient designation of certain very elementary studies of common natural objects and processes; and since it is commonly agreed that the materials for such study may be drawn from any phase of nature, it is certainly quite appropriate that a word with such general significance as has nature-study should be widely adopted. It is not probable that any of the critics of the term could suggest a better one; in fact they are not known to have made any useful suggestions concerning a possible substitute term. The word nature-study has certainly come into the language to stay, and at this late day we might just as well try to eradicate the words biology and cell as to replace nature-study with some other word.

One other point: It is true that some very imperfect work in many schools has been called nature-study, but that also is no reason why we should apologize for the term. Instead of wasting time apologizing we ought to be working to make the work more perfect. It would not be difficult to point out much science work in colleges which does not deserve the word science, and likewise one could easily look back a few hundred years in human history and point out a great many things which were not worthy of the names now applied to them. It seems, therefore, that an apology for the word nature-study, because some weak work has been called nature-study, is not demanded. It is even more senseless than apologising for established words because their etymological derivation does not happen to be satisfactory from a philological standpoint.

Let us then have done with all attempts at direct and implied apology for the word *nature-study*. We know that the teaching under that heading has had and still has serious defects, but we now have some very definite ideas as to how it may be made more perfect. The word naturally suggests just what we want it to suggest, namely, general study of nature not differentiated into the special sciences. Let us then take the word as the best

usage has already made it—a comprehensive general term for the most elementary studies of nature, especially for pupils of elementary school age. We certainly need such a term; and no better term than nature-study has been suggested. "Elementary science" is too easily confused with high-school science which has definite characteristics. "Natural history" is no longer understood to include more than biological topics. "Elementary agriculture" stands for only one and that a limited phase of the studies of nature needed in schools in general. Only the word nature-study is available as a general term for elementary undifferentiated study of both organic and inorganic nature according to scientific methods but not closely imitating advanced science. Nature-study, then, stands as a general term for all studies of natural objects and processes which have been found most suitable for beginners, most of whom are the pupils in elementary schools.

A TEACHERS' EXAMINATION IN NATURE-STUDY

[EDITOR'S NOTE.—The following interesting set of questions has been sent to the editor of THE REVIEW by a teacher who took the examination for an assistantship in a normal school. The questions were written down from memory after leaving the examination room, for the rules prohibited the removal of copies. We may wonder as to how many authors of nature-study books could make a passing mark in such an examination.]

1. a. Write ten topics or questions in nature-study which might properly be set before the elementary-school pupils for the purpose of leading them to reason.

b. Taking one of the above as for class-room study, outline briefly with critical comments a lesson on that topic.

2. What is meant by the "scientific method of investigation?" Show to what extent the scientific method of investigation can be used in teaching in the elementary schools.

3. Name five faults which teachers of elementary science are prone to fall into. Explain how a training-school teacher should deal with such matters with students.

4. State the value of a "type" in teaching. Mention some suitable type for use in nature-study. State reasons for selection and show how it applies in this subject.

5. Draw a picture of each of the following birds: humming-bird, swallow, snipe, hawk, parrot. In connection with the drawings, explain the characteristics of each.

6 a. Give a synopsis of a lesson on a fish suitable for elementary-school grade.

b. How would a synopsis of high-school work on the fish differ from the above? Explain, giving reasons.

c. Explain, with aid of diagrams, the circulation of blood in the fish.

7. Describe a scheme for teaching "The Seasons" to a low elementary grade.

AMERICAN NATURE-STUDY SOCIETY

New Members and Changes of Addresses

So few changes have been made since the directory was published last March that it seems wise economy of the Society's funds to defer a new edition to early in the year 1911. Meanwhile, the following lists of changes and new names should be added to the directory. Extra copies of the directory will be mailed on application to the secretary of the Society.

The secretary will welcome information concerning errors in the following lists or in the directory.

Changes of Address

NOTE—If only mail address is given below it means that so far as the records show the former position as given in the directory is still held. New appointments are indicated by the titles of positions.

Anthony, A. Gertrude—2714 Alcatraz, Calif.
Boostrom, E. A.—Principal of Schools, Stromsburg, Nebr.
Bunting, Martha—Teacher of Biology, Tryon, N. Carolina.
Charles, F. L.—Asst. Prof. of Agricultural Education, Urbana, Ill.
Cummings, J. M.—Instructor in Nature-Study, Salt Lake City, Utah.
Cushman, H. Mary—Teacher of Science, 3301 Powelton Ave., Philadelphia, Pa.
Davis, Luther S.—128 Jacques Ave., Rahway, N. J.
Edwards, Irene—So. Qu Appelle, Canada.
Goldman, Meyer—Montclair, N. J. (172 Orange Road).
Hale, Elizabeth C.—Principal P. S. 98 Manhattan, 10 St. Charles Place, Brooklyn, N. Y.
Hall, Marguerite L.—6203 Euclid Ave., Cleveland, Ohio.
Helmer, Adella G.—11 Arthur St., Atlanta, Ga.
Hess, Irene—602 West 178 St., New York City.
Hinshelwood, Mabel—Teacher in Public Schools, 97 Engle St., Englewood, N. J.
James, McNeal C.—State Normal School, Volley City, N. Dakota.
Kaufman, Pauline—173 E. 124 St., New York City.
Kent, Harry L.—Science Teacher, Normal School, Keene, N. H.
Kilmer, Cordelia S.—Incorrectly Wilmer in 1908 directory.
Kirkwood, Joseph E.—Professor of Botany, Univ. of Montana, Missoula, Mont.
Ledyard, Edgar Madison—Prof. of Zoology, Univ. of the Philippines, College of Agriculture, Los Banos, P. I.
Marshall, Ruth—Teacher of Biology, Rockford College, Rockford, Ill.
Morrison, Grace—Teacher, Miss Porter's School, Farmington, Conn.

Parker, Isabel A.—Chicago, Ill. (299 S. Springfield Ave).
Pritchett, E. Esther—Training School, 220 West 120th St., New York City
Reed, Margaret A.—172 Orange Road, Montclair, N. J.
Rood, Stanley Cale—Hartford, Conn. (95 Atwood St.).
Sheehan, Lucy A.—New York City (83 St. Nicholas Place).
Silcox, S.—Principal of Normal School, Stratford, Ontario, Canada (Toronto by error in directory).
Smith, Annie C.—Teacher, Staten Island Academy, New Brighton, Staten Island, N. Y.
Tredick, Helen F.—Graduate student in Teachers College, New York City.
Wilson, Anna L.—Critic Teacher in the Perkins Normal School, Akron, Ohio (200 Ellwood Ave.).

New Members

Some of these are paid for 1909, and some begin with January, 1910. In some cases the official position or business is not yet on the Society's records. Please send full information to the secretary as soon as possible.

New members who have not yet received the directory of members which was issued last March may obtain it by writing to the secretary.

If names have been omitted, please inform the secretary at once.

Abbs, A. W.—2271 Sixth Ave., Fairview W., Vancouver, B. C., Canada.
Abercrombie, Ivy—The Hermitage, Kerrisdale, Vancouver, B. C., Canada.
Allen, Josephine—Student, Normal School, 56 Greenbush St., Cortland, N. Y.
Andrews, Marguerite—Student, Normal School, 55 Greenbush St., Cortland, N. Y.
Austin, Vida A.—Asst. in Biology, Northern Illinois State Normal School, 121 Park Ave., De Kalb, Ill.
Avery, Katherine, —Student, Normal School, 121 North Main St., Cortland, N. Y.
Babcock, Ernest B.—Asst. Prof. Agric. Education, Agric. Exper. Station, Berkeley, Calif.
Bakeless, O. H.—Dept. of Pedagogy, State Normal School, Bloomsburg, Pa.
Barker, F. D.—Asst. Prof. of Zoology, Univ. of Nebraska, Lincoln, Nebr.
Barrows, Walter B.—Prof. of Zoology and Geology, Michigan Agric. College, East Lansing, Mich.
Bartholomew, Albert J.—Student, Normal School, 18 Homer Avenue, Cortland, N. Y.
Basset, G. E.—Clark University, Worcester, Mass.
Beach, Mabel—Student in Normal School, 11 Monroe Heights, Cortland, N. Y.

Black, Sarah L.—Student, Normal School, 5 Owego St., Cortland, N. Y.

Bovard, John Freeman—Asst. Prof. of Biology, Univ. of Oregon, Eugene, Oregon.

Bolystons, Margery—Teacher, Packer Collegiate Institute, Brooklyn, N. Y. (59 Livingston St.).

Britton, Lilian—Girls' High School, Oudtohoorn, Cape Colony, So. Africa.

Bruce, Edwin M.—Instructor, Chemistry, Indiana State Normal School, Terre Haute, Ind. (2401 N. 9th St.).

Bruner, Jesse—Teacher in High School, Grand Forks, No. Dak.

Burdick, Fayette—Student, Normal School, 5 Pleasant St., Cortland, N. Y.

Burdick, Susie L.—Student, Normal School, 14 Richard St., Cortland, N. Y.

Carmine, Edwin N.—Supt. of Schools, 4841 Baring Ave., East Chicago, Indiana.

Chalmers, Zoe—Lakeside, Calif.

Corcoran, Josephine A.—Student, Normal School, 52 S. Main St., Cortland, N. Y.

Craig, Martha M.—Student, Normal School, 59 Railroad St., Cortland, N. Y.

Daley, Elizabeth—Student, Normal School, 86 Elm St., Cortland, N. Y.

Dochrill, James C.—American Book Co., 521–531 Wabash Ave., Chicago, Ill.

Donnelly, Gertrude—Student, Normal School, 61 Groton Ave., Cortland, N. Y.

Dougan, Lewis M.—Principal, Garfield School, 3455 Pestalozzi St., St. Louis, Mo.

Durfee, Janette, —Student Normal School, 27 Groton Ave., Cortland, N. Y.

Earle, Olive M.—Student, Normal School, 31 James St., Cortland, N. Y.

Farley, Elizabeth M.—Student, Normal School, 28 Greenbush St., Cortland, N. Y.

Felelon, Rena—Student, Normal, 61 Groton Ave., Cortland, N. Y.

Ferguson, A. M.—Botanist, Sherman, Texas.

Ferris, Louise—Student, Normal School, 41 Church St., Cortland, N. Y.

Fink, Albert—Teacher of Biology, 17 West 111th St., New York City.

Ford, Ella—961 W. William St., Decatur, Ill.

Foumans, Stella C.—Student, Normal School, 47 Greenbush St., Cortland, N. Y.

Gibbs, Mary E.—Student, Normal School, 55 Greenbush St., Cortland, N. Y.

Goodsell, Ella—Student, Normal School, 10 Schermerhorn St., Cortland, N. Y.

Greene, Dr. M. Louise—Author, 14 University Place, New Haven, Conn.

Griswold, Edith V.—Student, Normal School, R. F. D. No. 4, Box 18, Cortland, N. Y.

Gunnerson, Wm. C.—Principal Madison School, 1392 Blackstone Ave., St. Louis, Mo.

Hamilton, Leon W.—Student, Normal School, 21 Washington St., Cortland, N. Y.

Harned, R. W.—Entomologist, Agricultural College, Mississippi.

Harvey, Leroy Harris—Prof. of Biology, Western State Normal School, Kalamazoo, Mich.

Hayes, Celia M.—Student, Normal School, Cortland, N. Y.

Hazard, Frederic—Asst. Sec. of A.A.A. S., Smithsonian Institution, Washington, D. C.

Hitchcock, Irene M.—Student, Normal School, 10 Pleasant St., Cortland, N. Y.

Hitchcock, Vernon C.—Student, Normal School, 100 Tompkins St., Cortland, N. Y.

Holdridge, Sara M.—Student, Normal School, 55 Port Watson St., Cortland, N. Y.

Hollenbeak, Frank—Student, Normal School 176 S. Main St., Cortland, N. Y. (Erin, N. Y.).

Holmes, Gladys—Student, Normal School, 4 East Ave., Cortland, N. Y.

Howard, Margareth E.—Principal of P. S., Summit, N. J.

Hunt, Mildred—Student, Normal School, 44 Port Watson St., Cortland, N. Y.

Jewell, Susan Grace—Prof. of Biology, Tabor College, Tabor, Iowa.

Jones, Erma B.—Student, Normal School, 40 Greenbush St., Cortland, N. Y.

Kingsberry, Edna L.—Student, Normal School, 4 Hill St., Cortland, N. Y.

Kinley, Leah B.—Student, Normal School, 107 N. Main St., Cortland, N. Y.

Kiritchko, N.—Red Gate, House Affremoff, Moscow, Russia.

Kornmann, Elsie N.—Principal P. S. 12, 371 Madison St., New York City.

Kotinsky, Dora—Woodbine, N. J.

Kotinsky, Jacob—Supt. of Entomology, Honolulu, Hawaii.

Lackner, Adele,—School of Education, Univ. of Chicago, Chicago, Ill.

La Pointe, W. F.—Supervisor of Schools, Lucena, Tayabas, P. I.

Lawford, Jasper M.—718 North Howard St., Baltimore, Md.

Leavitt, Mary F.—Teacher of Biology, Rogers High School, Newport, Rhode Island (14 Malbone Road).

Leavitt, Robert Greenleaf—Instruction in Biology, New Jersey State Normal School, Trenton, N. J. (151 Monmouth St.).

Lee, G. W.—200 Chestnut Hill Ave., Brookline, Mass.

Levin, Kathryn—Teacher, 836 No. 5th St., Philadelphia, Pa.

Lines, Leora B.—Student, Normal School, 10 Pleasant St., Cortland, N. Y.

Lloyd, Francis Ernest—Prof. of Botany, Alabama Polytechnic Institute Auburn, Ala.

Mackay, A.—Supervisor of Schools, Halifax, Nova Scotia, Canada.

Masten, C. Effa—Student, Normal School, 97 Tompkins St., Cortland, N. Y.

Nicholas, Lutie P.—Student, Normal School, 31 Arthur Ave., Cortland, N. Y.

Oakes, Belle—Student, Normal School, 32 Port Watson, Cortland, N. Y.
O'Brien, Margaret A.—Lower Onslow, Colchester Co., Nova Scotia, Canada.
Parsons, Marion—Student, Normal School, 55 Greenbush St., Cortland, N. Y.
Petrie, Edith K.—Student, Normal School, 81 Lincoln Ave., Cortland, N. Y.
Randall, Grace M.—Student, Normal School, 5 Owego St., Cortland, N. Y.
Randall, John L.—Director of Nature-Study and School Gardening, Pittsburgh Playground Association, 707 Lyceum Bldg., Pittsburgh, Pa
Reynolds, Carrie B.—Student, Normal School, Mr. Robert Otto, Clayton Ave., Cortland, N. Y.
Robinson, Mrs. Mary E.—Pincipal Baden School, Halls Ferry Road and Newby St., St. Louis, Mo.
Rogers, E. Charlotte—Teacher of Biology, 43 Eastern Ave., Lynn, Mass.
Rogers, Julia Ellen—Director Nature Club in *Country Life in America*, Lecturer on Nature Subjects, 340 Rahway Ave., Elizabeth, N. J.
St. Louis Public Schools, Educational Museum, St. Louis, Mo., Eades and Theresa Aves.
Sanders, E. A.—Teacher of Botany, Steele High School, Dayton, Ohio.
Schutt, Anna S.—Student, Normal School, 14 Prospect St., Cortland, N. Y
Scott, Wm.—Principal Normal School,, Toronto, Canada.
Servis, Ethel M.—Student, Normal School, 40 Greenbush St., Cortland, N. Y.
Seymour, Blanche—Student, Normal School, 146 Main St., Cortland, N.Y.
Silcox, S.—Principal Normal School, Stratford, Ontario, Canada.
Slocum, Charles Elihu—Physician and Prof. of Biology, Defiance College, Defiance, Ohio.
Smith, Ada K.—Teacher, 44 Elm St., Oneonta, N. Y.
Smith, Frank—Assoc. Prof. of Zoology, Univ. of Illinois, Urbana, Ill.
Smith, Mrs. F. A.—R. R. No. 2, Nevada, Iowa.
Smith, G. D.—Director of Science, State Normal School, Richmond, Kentucky.
Spawn, Minnie L.—414 N. Pine Ave., Austin Station, Chicago, Ill.
Stevens, Marjorie—Student, Normal School, 26 Clayton Ave., Cortland, N. Y.
Stevens, W. J.—Principal Field School, 4043 Juniata St., St. Louis, Mo.
Terry, Florence C.—Student, Normal School, 23 No. Church St., Cortland, N. Y.
Watson, William Franklin—Prof. of Chemistry and Biology, Furman Univ., Greenville, So. Carolina.
Weingart, Amelia—Teacher P. S. 77, Manhattan (2041 Seventh Ave.).
Weeks, Charles Rozell—Prof. Agriculture Dept., Nebraska State Normal School, Peru, Nebr.
Wood, Agnes—Student, Normal School, 32 W. Court St., Cortland, N. Y.
Woodin, Lulu M.—Student, Normal School, R. D. 2, Box 9, Cortland, N. Y.
Zvirin, Dora—Student, Normal School, 76 Railroad St., Cortland, N. Y.

TEXT-BOOKS OF AGRICULTURE

BENJ. M. DAVIS
Miami University, Oxford, O.

One evidence of the growing interest in agricultural education in the public schools is the number of text-books on elementary agriculture that have appeared in recent years.

Most of these books are informational in character. All important phases of the subject are generally presented in simple language easily within the grasp of the pupil. It is assumed that the pupil has had concrete experiences in agricultural matters, and that the text will help him to interpret these experiences. There is a minimum of effort required of the pupil to find out things for himself. Questions, when given at the end of each chapter, are usually a summary of the text and test the memory rather than ability to interpret. Sometimes experiments are introduced, either in the text or at the end of a chapter. Conclusions to be drawn from these experiments are either so implied in the text or so obvious that the experiments become merely concrete examples or illustrations of discussions in the text.

Books of this kind are easily adapted to the prevailing recitation method and consequently are in extensive use. The Superintendent of Public Instruction of one State, where teaching elementary agriculture is required, advises teachers to use the adopted book on agriculture as a reader. It is quite likely that the practice of using the text as a reader obtains in other places.

Several books have appeared in which the experiment predominates. Here problems and some suggestions as to procedure are given. The pupil is expected to find answers by means of his own investigations. He is supposed to learn how to find out things for himself. This method doesn't fit in very well with prevailing methods of teaching, for not many of the teachers, themselves, have had the benefit of laboratory training, and therefore, know very little of any other than the book method of learning or teaching. After agriculture has been taught as a laboratory science for awhile in our rural high schools and country training schools and when graduates of these schools become teachers in rural elementary schools, books of the experimental type will no doubt have a greater demand.

Another type is the text-book in which agriculture is correlated with arithmetic. Problems for the exercise and illus-

tration of various arithmetical principles relate to agricultural affairs. This is in accord with some of the recent tendencies of mathematical teaching where attempts have been made to reorganize the subject by omitting many of the traditional features, and by presenting the essentials of the subject closely associated with its application to things of every day life.

A fourth type has to do with secondary schools. Good instruction in agriculture in high schools is probably the most important phase of agricultural education yet to be developed. This is important for several reasons, but chiefly because of the reaction on the elementary schools. Teachers in the elementary schools in rural communities are being recruited more and more from rural high schools. In some states seventy per cent of the present teaching force have no more than a grammar school education. The per cent of teachers with this small preparation for teaching is, taking our country at large, much higher than any of us likes to contemplate. It is to the new teachers who are to have at least a high school education that we must look to carry agricultural education into the rural elementary schools. A good text-book, with well selected experiments, although alone not sufficient, is, nevertheless quite essential to any general introduction and efficient agricultural instruction in rural high schools.

Among the text-books reviewed will be found good examples of each of the four types that have been described. Other reviews will follow in later numbers of this magazine. The editor of this department will be glad to give notices of the new books as they appear.

Review of Books on Agriculture.

One Hundred Lessons in Elementary Agriculture. By A. W. Nolan. Morgantown, W. Va. Acme Pub. Co., 1908. This very useful book aims to give suggestive subject-matter and methods upon which the teacher may build from his own initiative. The wide range of topics included in the hundred lessons touches all important phases of agricultural problems. Soils, seeds, gardens, trees, crops, insects, weeds, poultry, foods, birds, machinery, rural civics and economics—these suggested by titles of prominent lessons will give some idea of the scope of the course of lessons. Much of it is good nature-study with agricultural materials and some of it is strictly the technical aspect of the science of agriculture.

Agriculture for Southern Schools. J. F. Duggar, New York: The Macmillan Co., 1908, pp. 355.

As its title indicates this book is intended especially for Southern schools the adaptation being the use of the best practices and materials of Southern agriculture for illustration.

The first part of the book deals with plant growth, including the plant's relation to the soil. The second part deals with crops, including enemies (the cotton boll weavil receiving particular attention), animal husbandry, farm machinery. Important reference tables are arranged in an appendix

The book is well written and ought to be easily understood by the average grammar-grade child.

Elements of Agriculture. W. C. Welborn, New York: The Macmillan Co., 1908 pp. XVI—359.

This book is prepared for use in Southern and Western elementary schools. Three phases of the subject are taken up, as follows: Crop production, including the plant and its environment, characteristics of various field crops, soil fertility, etc.; special crops in which the management of each crop is described in detail; animals production, including feeding and ration, care of animals, various kinds of farm animals in detail. An appendix gives classification of most common economic plants, plant diseases and insect enemies of plants and their remedies, score cards for judging, and a glossary. The book is well adapted for the grades in which it is intended to be used.

Elements of Agriculture. G. F. Warren, New York: The Macmillan Co., 1909, pp. XXIV—434.

The author has attempted to carry out the suggestions of the Committee on Instruction in Agriculture of the Association of American Colleges and Experiment Stations, and has intended the book to be used in high schools but has made it advanced enough for short college courses. All important phases of agriculture are discussed in the eighteen chapters that make up the body of the book. The text of each chapter is followed by questions, laboratory exercises and collateral reading.

A summary of chapter V, **The Soil,** will illustrate the method of treatment which is typical of each chapter: The soil, sub-topic: what soil is; rock particles, sub-topics: amounts of mineral matter, how size of particles is determined, how soils are named, importance of size of soil particles, relation of size of particles to water, relation of size of soil particles to plant food, relation of size of soil particles to air, size of particles in relation to temperature, size of particles and crop adaptation, the best soils, flocculation; soil water, sub-topics: importance of soil water, movements of water in soil, conservation of moisture, dry-land farming, irrigation, drainage (the last two sub-topics are further subdivided); soil air, sub-topic: importance of soil air; organic matter of the soil, sub-topics; the uses of humus, humus of arid and humid soils; life in the soil, sub-topics: importance of soil organisms, soil-bacteria. The chapter is reviewed by means of twenty-four questions. The following is typical: "Where does a fence post rot most rapidly? Why?

Fifteen excellent laboratory and field." exercises give concreteness to the text. Ten good references are given in the collateral reading.

There is a twenty page appendix containing eighteen useful tables, including apparatus and equipment, agricultural library, addresses of agricultural colleges and experiment stations, seeds, weights and measures, fertilizers, feeding standards nutrients and statistics.

The proper use of this book in high schools should, as Dean Bailey says in its preface, "make the teaching of agriculture in the existing high school comparable in extent and thoroughness with the teaching of physics, mathematics, history and literature."

Rural School Agriculture. Charles W. Davis, New York: The Orange, Judd Co., 1907, pp. VII—267.

"This book is a manual of exercises covering many phases of agriculture." There are 143 of these exercises, divided as follows: miscellaneous, plants, soils and fertilizers, corn, wheat and oats, fruits, home grounds, insects and spraying. The exercises follow an uniform plan consisting of name of exercise, time best suited to it, object, material needed, directions (often illustrated by good figures), and questions. An exercise is devoted to each of the common orders of insects. We note that the dragon fly is given as an example of the Neuroptera. Instead of a systematic study of insects this part of the book might be improved by a series of studies on life-histories and activities of some common insects of economic importance.

On the whole the book is to be commended, and especially for the general plan of having the pupil find out things for himself.

First Principles of Soil Fertility. Alfred Vivian, New York: The Orange, Judd Co., 1908, pp. 265.

Although the author has intended this book for home reading it should find a place in the library of every school where agriculture is taught. It is divided into four parts: Plant food its nature and source; making potential plant food available; barnyard manure; commercial fertilizers. The subject of barnyard manure is particularly well treated. The manurial value of various feeding stuffs is discussed at some length and clearly presented.

The book is concluded in the several tables on composition of fertilizers and fertilizer constituents.

A Practical Arithmetic. F. L. Stevens, Tait Butler, and Mrs. F. L. Stevens, New York: Charles Scribner's Sons, 1909, pp. IX—386.

In addition to the usual aims sought in arithmetic texts, the authors have included "teaching of valuable facts by basing the problems of the book upon problems of real life." While many may not concede that "great benefit is derived from the exercise of the reasoning powers and their consequent development," all must agree that a very fine collection of interesting and valuable applications of arithmetic to the affairs of farm life are brought together in this book.

Whether or not in using the book the "pupil will unconsciously absorb and retain many valuable facts and principles relating to agricultural practice" remains to be seen for the matter has never been carefully tested in just this way.

In turning the pages of the book one misses all the old familiar hypothetical problems concerning what A and B did, but finds instead of these time honored puzzles, such problems as: "If kainit contains 12½% of potash, and muriate of potash contains 50% potash, how many pounds of kainit will it take to supply as much potash as 40 pounds of muriate of potash?" "What would it cost to spray the potatoes and apples, and treat all the oat seed planted in within a mile of your school?"

"Wherein will the following ration fail, according to the feeding standard, in meeting the requirements of a dairy cow giving 16.5 lbs of milk a day. Ration: 35 lbs. corn silage, 10 lbs, corn stover, 5 lbs. corn. 5 lbs. wheat bran."

These problems were selected at random. It must be understood that plenty of data for solving such problems have been presented either in tables, or in preceding simpler problems.

For the child whose experiences have come from farm life the book should present arithmetic in a new light. It should make plain to him many practical applications of the subject to things right at home, and impress him with the fact that, after all, there is something in arithmetic besides merely "doing sums."

NOTES ON BOOKS AND PAMPHLETS

(Some of the books mentioned have been received recently and may be reviewed later.)

Lessons in Nature-Study. By Prof. Herbert Brownell, of Peru, Neb., contains many good suggestions for inorganic nature-study. The price is not stated, but is probably about 25 cts.

Primer of Forestry. The entire book with this title is now available in the free Farmers' Bulletins, 173 and 358.

School Nature-Study. The London periodical with this title, official organ of the School Nature-Study Union, regularly devotes most of its space to articles dealing with the subject-matter of nature-study. The secretary is H. E. Turner, 1 Grosvenor Park, Camberwell, S. E., England.

Methods of Nature-Study. A pamphlet for use of normal school students in methods of nature-study and elementary Science. By L. S. Hawkins, State Normal School, Cortland, N. Y. Very suggestive to teachers who conduct such courses.

Minnesota Nature-Study. A course of study prepared for elementary grades by Florence E. Lillie. Published by State Dept. of Public Instruction, Minneapolis.

Nature-Study Exhibits. Suggestions for those interested will be found in report of H. L. Drummer, Bath, N. Y., on tenth exhibition of Steuben Co. Nature-Study Workers of the Public Schools.

Biology in New Jersey. A syllabus prepared for the New Jersey Science Teachers' Assn., by G. H. Trafton, of the Passaic High School, chairman of a committee, contains a large amount of excellent nature-study because pupils have not had this subject in the elementary schools.

"Science" Course for Elementary Schools. Papers by O. C. Kenyon, L. S. Hawkins and others, in Education Dept. Bulletin No. 459, Albany, N. Y. Also contains papers on high-school biology and agriculture.

Tree Observations. The U. S. Forest Service appeals for cooperation in observing the time of leafing, blossoming and fruiting of the most important forest trees. On request blanks and pamphlets will be sent.

Administration of Agricultural Instruction. A suggestive paper by C. H. Robison, of the Montclair (N. J.) Normal School, is reprinted from the Proceedings of the Agricultural Conference, published by Massachusetts Agricultural College, Amherst, Mass.

Nature-Study at DeKalb, Ill. The bulletin of the State Normal School gives a course in Nature-Study for Grades I to IV. It properly includes plants, animals, human body and health, weather, minerals and soils, physical and chemical phenomena, agriculture and other applied science for elementary grades.

Garden Work in California. A helpful 98-page bulletin by Prof. E. B. Babcock, of the College of Agriculture, University of California.

Elements of Agriculture. By G. F. Warren, of Cornell University. New York: Macmillan Co., pp. 437, ill. $1.10.

Practical Arithmetic. By F. L. Stevens, T. Butler and Mrs. Stevens. (Applied especially to agriculture.) New York: Scribners.

Practical Agriculture. By John W. Wilkinson, A.M. Assistant State Superintendent of Public Instruction, Oklahoma. Pp. 383. $1.00. American Book Co. New York.

Life of a Fossil Hunter. By Charles H. Sternberg. New York: Holt & Co. 1909.

College Geology. By T. C. Chamberlin and R. D. Salisbury. Pp. 978, ill. New York: Holt & Co. 1909. (A valuable reference book for teachers of biology and earth science in high schools.)

Reproduction and Sexual Hygiene. By Winfield Scott Hall, of the Northwestern University Medical School. Chicago. Wynnewood Pub. Co. 150 pp. $1.00. Sixth edition. (This is the most sane, sensible and scientific book for young men which, among many dozens of similar books, has come to the attention of the writer of this book note. It has the scientific atmosphere of university lectures in science, and is entirely free of the appeals to the emotions which repel so many readers of the most common books in the same line. Dr. Hall's book should be read by every young man over eighteen years old.)

Geology of City of New York. By L. P. Gratacap. Third and enlarged edition. New York: Holt & Co. $2.50. (Popular in style and valuable for local study.)

Human Body and Health. By A. Davison. Intermediate Book. New York: American Book Co. 1909. (The second book of a very practical series by Professor Davison, of Lafayette College.)

Introduction to Study of Biology. By J. W. Kirkaldy and I. M. Drummond. Oxford: Clarendon Press. 1909. (A high-school book, primarily for schools in England.)

Laboratory Botany. By Willard N. Clute. Boston: Ginn & Co., 1909. 177 pp. 75 cents. (Appears to be a very practical guide. Part I, structure and Life Processes of Seed Plants; Part II, Evolution of Plant Kingdom illustrated chiefly by series of crytogamus; Part III, contains thirty-six experiments in plant physiology.)

Training of Farmers. By L. H. Bailey. New York: Century Co. Pp. 263. (An important contribution to the problems of agricultural education and country life.)

School Garden Book. By C. M. Weed and P. Emerson. New York: Scribners, 1909. Pp. 320, ill. (A series of very readable and inspiring essays on gardening, followed by garden exercises for pupils.)

Primer of Sanitation. By John W. Ritchie. Yonkers, N. Y. World Book Co., 1909. 50 cents. (A pupil's book on disease germs and how to fight them. For fifth or sixth grade pupils. A Primer of Hygiene for Primary grades and a Human Physiology for grammar grades are, or will be, published in the same series. The book in hand is full of practical information, and it is a great improvement over the so-called "intermediate Physiologies" which dealt with stomachs and livers, and other things internal).

Practical Guide to Wild Flowers and Fruits. By George L. Walton. Philadelphia. Lippincott Co. 1909. Pp. 228, illustrated. (A convenient arrangement, based primarily in colors, for finding the names of about 400 flowers and 100 fruits which are common.)

Mosquito Life. By Evelyn G. Mitchell. New York: Putnams. 1907. Pp. 280, illustrated. (A popular account of the habits, life-histories, identification, and control of mosquitoes in the United States.)

First Year Science. A laboratory manual for high schools. By W. S. Russell and H. C. Kelly, of Springfield, (Mass.) High School. New York: Holt & Co., 1909. (A collection but not an articulation of experiments, some interesting and some otherwise, from the field of general science. Certainly presents valuable information; but so disjointed as to demand critical testing in many schools before we can be sure of its merits.)

Advanced Physiology and Hygiene. By Herbert W. Conn and Robert A. Budington. New York: Silver, Burdett & Co. Pp. 419, illustrated. $1.10. This latest addition to the long list of high-school books for physiology and hygiene is very similar to several of the books which have appeared in recent years in that study of functions, personal and public hygiene, and the point of view of general biology makes the recent books in striking contrast with those of two decades ago when anatomy was the most prominent part of school books called "physiologies." However, this book does not neglect anatomy; but on the contrary it has a few hundred technical anatomical terms which are of doubtful significance in secondary education. Like many other recent books, this one begins with cells and tissues, instead of with the skeleton and other larger parts; but the value of his arrangement is, in the oipnion of many biologists, exceedingly doubtful. The lessons on foods and food habits and those relating to bacteria and disease will probably appeal to teachers as the most practical.

On the whole, the book will well serve as a text for special classes in human physiology and hygiene in high schools.

One who carefully examines this and other similar text-books in which an abundance of general biology has been woven into connection with study of the human body must question whether it would not be better to teach human biology as an outgrowth of courses in general biology, rather than drawing upon biology for numerous more or less disconnected references to plants and animals.

A CORRECTION

In the October REVIEW, the student's report on best varieties of peas for gardens was contributed by Mary F. Barrett, not Bartlett as printed, of the State Normal School at Montclair, N. J.

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[Names of contributors are printed in small capitals. Abbreviated titles of books reviewed are in quotation marks. The abbreviation n.-s., for nature-study is used. Pages of issues by months—Jan., 1-32; Feb., 33-64; Mar., 65-91; April, 92-116; May 117-140; Sept., 141-164; Oct., 165-196; Nov., 197-220; Dec., 221-251

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